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A FRENCH MITRAILLEUSE IN ACTION

The Naval Battle in the North Sea
New Things in Science and Invention

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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

The purpose of this journal is to record accurately, simply, and interestingly, the world's progress in scientific knowledge and industrial achievement.

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The First Month of the War

AT the opening of the war it was well understood (for a distinguished German general had written it all out in a book) that the grand strategy of Germany would be to concentrate the flower of her army against the French, overwhelm and scatter them in the first two or three weeks of the war, invest Paris, and then turn against Russia in an equally swift and crushing onslaught. At the present writing, with the war over a month in progress, nothing of the kind has happened. The French and British armies are intact and everywhere in touch; they have fallen back upon the line of forts and strongly intrenched positions, provided years ago by France to meet the inevitable German attack; and for the past three weeks they have not only presented an impregnable wall of defense, through which the Germans have failed to break; but in the rearward movement to their present position, they have fought a series of defensive battles in selected and entrenched positions, which, on the theory that the losses are three to one against the attacking force, must have cost the German army already not less than 200,000 men in killed, wounded, and otherwise disabled.

The Germans, it is true, have forced back the left wing of the allies; but they have done this at an enormous military and *moral* cost. The military cost has been due to the fact that here they found themselves opposed by 100,000 professional soldiers, men who, during their seven years of service with the colors, had been so thoroughly drilled in practice at the rifle butts, that they were crack marksmen; which fact, coupled with the traditional steadiness of British troops under fire, enabled them, against odds of between two and three to one, to fight a series of defensive actions in selected positions, from which they did frightful execution upon the heavily-massed columns of the Germans.

To the enormous losses in men entailed in this flanking movement, is to be added the even more serious moral loss which Germany has incurred in bartering her national sense of honor in exchange for the opportunity presented by the undefended French-Belgian line to rush across the French border in overwhelming numbers. France and Germany had both guaranteed the neutrality of Belgium. That France intended to stand by her pledge is abundantly proved by the fact that, when Germany made her rush through Belgium, France, even in spite of the delay afforded by the staunch Belgian resistance, had no time to concentrate her troops in Northeastern France in sufficient numbers to check the German onslaught. Nothing that Count von Bernstorff or any other apologist of the German breach of good faith may say, can make the American people think that Germany believed France was intending to do that which she herself has done. The facts are all absolutely and conclusively against such a supposition. So little preparation had France made to resist a German invasion through Belgium, that, had it not been for the totally unexpected interposition of England on behalf of Belgium, and the magnificent fight against overwhelming odds put up by the small Belgian army, Germany to-day would be inside the very gates of Paris.

The French line of defense stretched from Belfort to the southern limits of the Belgian frontier. North of that she believed that her defense consisted of a "sheet of paper" with the solemn attest thereon of herself and her great German neighbor. The loss to France and Belgium of the fair lands that are now being overrun with fire and sword by Germany, is, after all, trivial compared with the enormous loss of moral prestige suffered by the ruthless invader—a loss which no carefully worded sophistication of the diplomat or the historian of the future can ever redeem.

The position of the allies to-day is strategically and tactically very strong. Based on a line of fortifications reaching from Belfort on the south almost to Paris itself; with strong reserves in the rear and ample railroad communications serving the allied army upon interior lines; with the spirit of the troops absolutely unbroken; and with the choice of several French seaports through which Great Britain can pour in her reserves, France and her allies find themselves facing foes that are feeling the enormous strain of weeks of attack on entrenched positions.

The probability is that the much-talked-of complete investment of Paris will never take place; and if not, how and where is Germany to deliver that crushing blow which is to put France under her heel, and release that half million of men which Germany must send to meet the victorious Russian advance, and to stiffen her sorely-worsted Austrian ally?

It is surprising that none of the military critics have drawn attention to the fact, altogether unprecedented in great wars, that there has been no breaking through and enveloping of any section on either side, German or French, of this great battle line, two hundred and forty miles long, in which, surely, there must be some two-and-one-half millions of men engaged. To our thinking, this fact is explained by the absence from the field of operation of *that secrecy of movement* which formerly rendered it possible to concentrate overwhelming strength against one or more portions of the enemy's lines, and break through and envelop and capture a whole army at a time. We all remember what happened at Metz and Sedan. Such catastrophes are not happening, and are not likely to happen, to-day.

Why?

Unquestionably the change has been brought about by the wonderfully efficient aeroplane scouting, of which so much is being done in the present war. The turning movement of the German right wing is not a case in point; for the success of that movement was due to the initial advantage gained by the violation of a treaty. It begins to look as though the grand strategy of the allies is to accept the initial advantage thus stolen by Germany and encourage the foe to break through at enormous sacrifice of men to Paris, the allies meanwhile swinging into position with their left wing pivoted upon the enormous defenses of that city and their right upon the equally strong defenses of Belfort.

Penalizing Invention

THE American patent system received a serious blow when the Senate of the United States, on August 26th, amended Section 4 of the Clayton Anti-trust Bill by forbidding any contract relating to patented articles that contains any provision "the effect of which" may be either to require the purchaser or lessee or licensee to acquire any article "not protected by the patent" or to restrict him from using any article. Parties to such contracts are made liable to a fine of $5,000 and imprisonment for one year.

Only patented articles, and manufacturers, dealers, and purchasers of patented articles, fall within this prohibition. For the first time in the history of invention, therefore, the possession of a patent has been made an essential element of crime. The pretext upon which this proposal is made is that legislation is needed in order to prevent restraints of trade under the cloak of patents.

No such legislation, in fact, is needed. In the Bath Tub Case (United States v. Standard Sanitary Manufacturing Company, 226 U. S. 20, decided in 1912), the Supreme Court of the United States held that patents afford no shelter to restraints of trade against the Sherman Law. The Supreme Court said (page 49):

"The added element of the patent in the case at bar cannot confer immunity from a like condemnation, for the reasons we have stated. . . . *Rights conferred by patents are indeed very definite and extensive, but they do not give any more than other rights, an universal license against positive prohibitions. The Sherman Law is a limitation of rights, rights which may be pushed to evil consequences and therefore restrained.* . . . The comprehensive and thorough character of the law is demonstrated and its sufficiency to prevent evasions of its policy 'by resort to any disguise or subterfuge of form' or the escape of its prohibitions 'by any indirection.'"

Some of the unexpected consequences of the Senate amendment are most disastrous and far reaching.

Agreements between manufacturers, dealers, and customers, by which manufacturers and dealers furnish and customers obtain complicated and delicate patented mechanisms, on condition that they use them only with supplies specially prepared for them, or in continuity with machines especially adapted to them, are often absolutely necessary. Every possible abuse and unreasonable extension of this entirely legitimate right, as the Supreme Court shows, is already prevented by the Sherman Law.

The amendment adopted by the Senate, however, outlaws every such agreement. An independent manufacturer, seeking to gain a foothold in the face of competition from the old established trade, frequently builds up a good will for his business by advertising and selling all his various products under the same brand. In order to push his entire "family of products" against the old established brands, he selects local dealers who undertake either to handle his products exclusively, or, as more frequently is the case, to handle a specified variety and quantity of his products for a specified period in consideration of a special discount.

In many lines of business, this arrangement is usual and necessary. Every possible abuse of this arrangement is already forbidden by the Sherman Law. This seems to have been recognized, as regards unpatented articles, for as to them the provisions adopted by the Senate have no application. If, however, any patented article happens to be included under such an arrangement, with the result that the agreement requires the dealer to buy both a patented article and also another article not covered by that patent, then the manufacturer and the dealer both become liable to a fine of $5,000 and to a year's imprisonment.

These penalties become operative regardless of whether the parties to the agreement have any knowledge of the fact that any article within the agreement is covered by the patent. Agreements drawn without any reference to patents, agreements drawn in ignorance of the existence of patents, and agreements which from time immemorial have been normal and customary, are all made criminal if they happen to include any patented article; while precisely similar contracts, relating to unpatented articles, may continue to be made with absolute impunity.

This manifestly unjust and discriminatory piece of legislation passed the Senate on September 3rd, 1914.

"Chiropractic"

THE *Health Bulletin*, published by the North Carolina State Board of Health, has rendered admirable service by its trenchant articles anent various forms of medical quackery. Its July number discusses "chiropractic," which is described as "a freak offshoot from osteopathy." "Chiropractors" assert that disease is caused by pressure on the spinal nerves, and can be eradicated by "adjusting" the vertebræ.

It appears that chiropractic is taught—at least in North Carolina—on the mail order plan. The chiropractic "college" will matriculate anybody who can pay the fee, regardless of previous education (or, rather, lack of it), and turns out a full-fledged chiropractor at the end of a few weeks' instruction by correspondence.

Chiropractic, whatever its shortcomings, is abreast of the times in its methods of advertising. The *Bulletin* describes a photoplay entitled "The Pale of Prejudice," now going the rounds of various moving-picture houses. "It shows a young physician with a most wonderfully equipped office, piled high with skeletons, chemical retorts, etc., with all the essentials necessary not only for studying anatomy, but for making *steel analyses*. He is called suddenly to see a young woman who is ill. He rolls up his sleeves, pours half the contents of an 8-ounce bottle down the young woman, who immediately dies." This discouraging experience naturally leads him to become a chiropractor, whereupon the State Board of Health takes away his license to practise medicine, and his engagement to the Governor's daughter is broken off. The next scene shows the young lady ill, and the whole State Board in consultation declaring that she has only an hour to live. The patient plucks a rose from her kimono, which she gives to her mother, who carries it to the ex-lover and ex-physician, whose chiropractic consulting-room is now seen to be innocent of skeletons and metallurgical apparatus. The young man rushes to his sweetheart's bedside, drives the medical fogies away with a six-shooter, and cures the expiring maiden in a jiffy, by means of three "adjustments" of her spine. "The final scene," says the *Bulletin*, "shows this particular branch of quackery licensed by the Legislature, the bill signed by the Governor. On the back of the programmes where this film is shown is the name of every chiropractor in town."

Engineering

Which is the Larger Vessel?—Although the "Aquitania" is 18½ feet longer than the "Olympic" and five feet wider, the latter is nearly ten feet deeper, and has a net tonnage of 22,350 and a gross tonnage of 46,359, as against 21,993 and 45,647 tons for the "Aquitania."

A Useful Application for Oxygen.—It has been found that if oxygen is added so as to bring the percentage from 21 to 23 per cent as at present in the blast of a blast furnace, there is a saving of 50 to 60 kilogrammes in the amount of coke required to smelt a ton of iron, and the iron produced is of a superior quality.

Electro Magnets on Steam Cranes.—An electro lifting magnet would frequently prove very serviceable for use with railroad wrecking cranes of the usual steam operated variety, but the necessary electric current is lacking. In such cases it has been suggested that a small turbo-generator could be easily fitted, and would be a valuable addition to the equipment.

A New Mineral Found in Tasmania.—Many rare minerals exist in Tasmania, and lately a new addition has been made to the list by the discovery of molybdenite, which is used in the manufacture of molybdenum steel, to which it gives special hardness and toughness. As the present price of this mineral is about $2,500 a ton, the discovery should prove of considerable value.

Dies with Screw Holes.—In hardening dies and punches, in which there are screw and dowel pin holes, it is common practice to plug the holes with asbestos, of the wick or granulated form, to prevent injury to the screw threads or enlargement of the dowel holes by scaling. When this is done, trouble is often experienced in cleaning out the holes, as the asbestos sometimes becomes baked on. To avoid this, the asbestos should be mixed with graphite and oil, as holes plugged with this mixture can be readily cleaned and will be found entirely free from scale and the like.

A Monster Aqueduct.—The aqueduct conducting the waters of the Owens River to Los Angeles is said to be the largest in the world. It is designed to deliver a minimum of 258,000,000 gallons of water daily into the San Fernando reservoir, 25 miles northwest of the city. No pumping plant is required, as the source of supply is several hundred feet above the city. The water will furnish a great amount of power—70,000 horse-power is anticipated—for electric lightning and other purposes. The total cost of the waterworks will be $25,000,000, and the installation of the power plant will be approximately $5,000,000 more.

A Waterproof Cement.—It is said that the United States army engineers have long used the following mixture for water-proofing cement: One part of cement, two parts of sand, three quarters of a pound of dry powdered alum to each cubic foot of sand. These are mixed and dried, and to them is added water in which has been dissolved three quarters of a pound of soap to each gallon. This, it is said, is nearly as strong as ordinary cement, and is quite impervious to water, and does not effloresce. For a wash, a mixture of one pound of lye and two pounds of alum in two gallons of water is often used.

A Novel Car Ferry.—An ice-breaking train ferry-boat has recently been built in England for transferring trains across the St. Lawrence River from Quebec to Levis. The tidal variation is 18 feet, and to provide for this the deck of the boat that carries the trains is arranged to be raised or lowered by a series of long screws distributed at intervals on either side, and all operated simultaneously by a special engine. This provides for receiving and transferring trains at fixed level terminals at either landing, the immediate connection between the shore end and the boat track being by a short hinged gangway attached to the boat deck. As the ferry is designed to operate throughout the winter a nickel steel screw propeller is located at the bow to clear ice from the landing stage. When not in use this propeller is permitted to run idly.

At a Meeting of the Institution of Mechanical Engineers, at Paris, recently, the subject of locomotive cab signals was discussed, and the opinion was expressed that such signals should always be of the audible kind, as these would not distract the attention of the engine man from the road in front, and the regular road signals. In support of this suggestion, the evidence of an engine driver at an accident inquiry was quoted as follows: "You must realize that when you are rushing along at 60 or 70 miles an hour you are seldom out of sight of signals, and in the daytime there are always men about the road; and but for the vigilance of drivers I think a number of men would be injured, such as linesmen and others, who are absorbed in their work. A touch on the whistle first announces your approach, and I do think that everything that can be done to liberate the driver from anything that takes his attention off the road when he is running should be done. The driver should always be able to devote his sole attention to looking out and to the manipulation of his regulators."

Electricity

Electric Locomotives for Mountain Line.—The new electric locomotives now in use on the Usui-Toge mountain railroad in Japan have two driving wheels and a pilot wheel. Inside the body of the locomotive are two electric motors of 400 horse-power, one of which serves to drive the adherence wheels by bar and crank, while the second motor is coupled to a pair of rack wheels for use on the rack-and-pinion system. Adherence and rack-rail are thus worked separately. Contact shoes work upon the under side of a third rail, and a trolley is also used in some places. Electric switching couplers for the motor contacts are operated by magnets fed by storage battery current at 80 volts.

Electric Floor Brush.—An improved electric brush for polishing wood floors uses an electric motor at the top and a large round flat brush underneath the motor. To keep the motor from turning about along with the brush, there is used a steadying device in the shape of a pair of square-shaped flat brushes at the sides of the central one. Each square brush is mounted on the end of a shaft projecting from the middle casing and is geared up so that the shaft works in and out as a plunger, so as to produce a to-and-fro movement of the side brushes. This steadies the whole set and at the same time allows of moving the whole very readily over the floor by means of the long handle.

New Diesel Motor for Dynamos.—Numerous attempts have been made to bring out a small oil engine of the Diesel type for use with dynamos, using an engine with spontaneous ignition and combustion at constant pressure, but such an engine-dynamo group of compact shape and small size has not as yet been produced in Europe hitherto. Success now follows the designs of one of the large construction works, and the result is a Diesel engine group which ranges from 10 to 200 horse-power. With the engine, which has 2 cylinders for the small sizes, is built an air compressor giving a pressure of 60 atmospheres for starting and for oil spray. On the engine is also an oil pump for cylinder supply. The dynamo is built alongside the engine on the same shaft. On the whole, the new Diesel groups will prove economical as well as easily handled.

French Parliament Installations.—The great building that houses the branch of the French Parliament known as Chambre des Deputés, at Paris, contains numerous up-to-date electrical and mechanical appliances. The main semi-circular Parliament session hall has no less than 602 seating places for the members of this body. The electric lighting system consists of a ceiling of ground glass, above which are disposed about 800 incandescent lamps in semi-circular rows, with reflectors on each lamp. In the basement is a good-sized electric plant containing eight dynamos operated by gas engines running upon coal gas from the city mains. Dynamos work upon a large storage battery on the premises, and the electric plant has an output of no less than 2,500 horse-power, this being needed for the main hall and numerous rooms or offices. In the basement is a large electric fan which draws in air so as to send it into the main hall, and in winter this air passes first through a steam radiator device to heat it up. At the top of the hall is a like motor fan for evacuating the air through the roof. Here is also mounted a large water tank containing 20,000 gallons, by which the hall can be flooded in case of fire. We should also mention the numerous telephone booths with which the building is provided.

Electric Motors for Pumping Plants.—The use of electric motors for operating pumping plants is on the increase in Europe. Such plants comprise city water works, sewage and drainage plants, and we may consider two general classes of pumps, namely piston and rotary pumps. We have already referred to the use of piston pumps, and now wish to refer to electric drive for rotary pumps. Although the output of the rotary pump is much less than that of the piston pump, the output of the high-speed electric motor which is usually coupled direct on the rotary pump is greater than that of slow-speed motors used with piston pumps. However, even with belt drive on piston pumps, the all-around yield is superior in this latter case. But the rotary pump has several advantages which lead to its use in a number of modern water pumping plants. Pump and foundations cost but little, and the plant, also, is of small size. Upkeep is small, for the bearings are almost always self-oiling. A recent compact group has an electric motor and pump mounted on the same base, and such groups are most advantageous. Motors are from 50 to 100 horse-power, and pumps can handle 150 cubic feet of water per minute. A good example of the use of compact rotary pump groups is seen in the large Bangkok water works which now uses five sets of this kind. An original plant is found at the Coethen water works where the source of supply is an underground well. Two electric pump sets are mounted directly in the bottom of the well shaft and can be placed in this narrow space without any trouble. The electric motors are built with special insulation in order to stand the dampness.

Science

Explorations on the Indo-Tibetan Frontier, which began with the punitive expedition against the Abors, following the murder of Mr. Noel Williamson, have now been in progress for three years, and have yielded very extensive geographical and ethnographical results. A total area of about 30,000 square miles of previously almost unknown country has been surveyed, extending along the entire frontier from Bhutan to Burma.

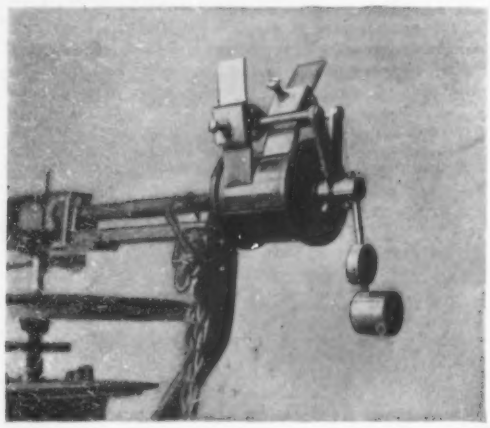
Ernest Solvay a Hostage.—Ernest Solvay, known the world over for his remarkable soda process, and one of the wealthiest industrialists of Europe, has been held by the Germans as a hostage for the payment of the $40,000,000 war levy imposed on Brussels by the Germans. Dr. Solvay received from the German Emperor a very important decoration, and the Berlin Academy of Sciences presented him with a gold medal. Besides he is a Nobel prize winner.

The American Association for the Advancement of Science will hold a summer meeting next year, viz., August 2nd-7th, in San Francisco and its vicinity. The general sessions and general evening lectures will be in San Francisco, while the sectional meetings will be held chiefly at the University of California, Berkeley, with one day's session at Leland Stanford University. As the meeting is to be held in connection with the Panama-Pacific Exposition, it is planned to have the scientific papers and addresses relate, so far as possible, to topics pertaining to the Pacific area.

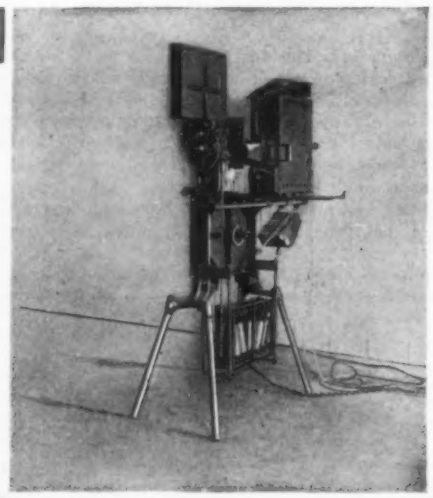
An Experiment in Osmosis.—The following is a very interesting and instructive experiment that may be performed by any one having a microscope of low power and the two chemicals, potassium chromate (K_2CrO_4) and barium nitrate ($Ba(NO_3)_2$). First make a concentrated solution of each of the chemicals and let a few drops of the chromate solution evaporate in a watch glass. Next pour out a few drops of the hot barium nitrate solution onto an object slide. With the point of a moist needle pick up a minute crystal of the chromate from the watch glass and place it in the middle of the bismuth nitrate on the object slide. Now focus the microscope on the yellow chromate crystal and it will soon begin to grow and send out streamers which will wind over the slide, curving around the crystals of bismuth nitrate very much as a root curves around a stone. If no microscope is handy, "osmotic plants" may be grown in a test tube using these same chemicals. First fill the test tube with a hot concentrated solution of the barium nitrate then drop in a crystal of the potassium chromate. The so-called "plants" will grow with remarkable rapidity.

The Kara Sea Route to Siberia.—Mention has already been made in these columns of the experimental journey from Europe to the arctic coast of Siberia which was so successfully carried out last year by the Siberian Company's steamer "Correct," having on board the managing director of the company, Mr. Jonas Lied, and the veteran arctic explorer, Dr. Nansen. It was also stated that the Russian government was doing its utmost to develop this new trade route, and had established wireless telegraph stations at the entrances to the Kara Sea for the purpose of keeping mariners advised of the ice conditions in that region. This year the enterprise has been taken up even more energetically. Mr. Lied's company has despatched two cargo steamers, of 2,400 tons each, from Tromsö, Norway, for the Obi and the Yenesei, and these were accompanied by six vessels belonging to the government, viz., two lighters, and four river steamers destined for use on the Yeneisei. The cargo steamers are equipped with wireless apparatus having a range of about 500 miles, while Mr. Lied has taken with him a moving-picture outfit, hydrographic apparatus, and other facilities for supplementing the commercial side of the expedition with valuable scientific work. It was hoped to establish wireless communication with some of the exploring expeditions now in the Arctic.

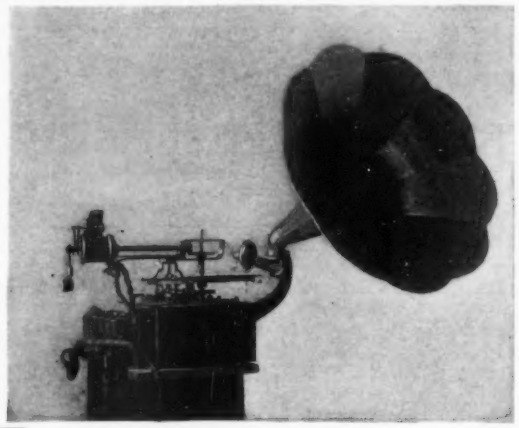
Dr. Albert Smith Bickmore, the first curator of the American Museum of Natural History, in New York, and for many years of the department of public instruction there, died at Nonquitt, Mass., on August 12th, as a result of an attack of pneumonia, at the age of seventy-five years. Dr. Bickmore was born on March 1st, 1839 at St. George, Me., and graduated at Dartmouth College in 1860. For the next four years, he studied with Prof. Louis Agasiz in the Lawrence Scientific School of Harvard University, and while there he became an assistant in the museum and went to Bermuda to collect for that institution. During the Civil War, he served with the Massachusetts volunteers. After the close of the war, Dr. Bickmore spent three years traversing the Malay Archipelago, China, Japan and Siberia, as well as several European countries. In 1868, he became Professor of Natural History in Madison, new Colegate University, and from 1869 to 1884 he was superintendent of the Museum of Natural History. When on a voyage to Europe with his father as a child he imbibed a fondness for travel, and during his connection with the museum he visited many parts of the world at his own expense, collecting materials for his public lectures.



The commutator that controls the solenoid motor.



The moving picture apparatus and solenoid motor that propels it.



The phonograph fitted with the commutator.

Combining the Phonograph and the Camera

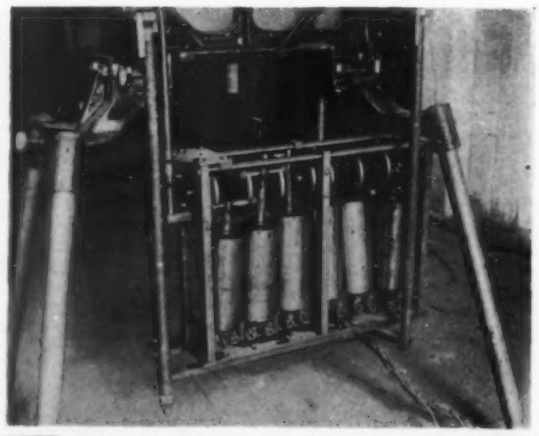
By Albert Marple

ONE of the most important of recent inventions is the electrically driven apparatus whereby absolute synchronism is obtained between the motion picture camera or projector and the phonograph. For years inventors have been trying to devise some means whereby motion pictures may be made to correspond accurately with the talking machine, thereby producing talking moving pictures. A number of machines have been presented, but without exception there has been something lacking in these. Either the talking machine would get ahead of the pictures or the projector would speed up, leaving the record on the talking apparatus far behind. The writer saw a very amusing exhibition in Los Angeles, Cal., some time ago. Talking motion pictures were the feature of the evening, and they drew a large crowd. The pictures and the phonograph record started off together and everything went well for a minute or so, when it could be noticed that the talking apparatus was gaining on the projecting machine. Soon the difference between the machines became so great that it was indeed amusing. The phonograph would reproduce a dog's bark, and a short time later the picture of the animal was thrown on the screen. The two machines failed utterly to register.

One of the latest talking picture machines in which electricity is brought into play, is the work of Mr. O. E. Kellum of Los Angeles. The writer has seen the apparatus in operation and can truly say that the work done by it is remarkable. From the time the machines were started until they were finished the synchronism was perfect. When the pictures opened the performer's mouth the phonograph made him sing or speak. A film five hundred or a thousand feet in length was run, with a correspondingly lengthy phonograph record having a single word or sentence in the middle, and the words and the pictures corresponded perfectly.

Any phonograph and projector or camera may be used with this apparatus, there being, however, some preparation to be done to the machines. The phonograph may be run by either electricity or other motive power, electrical energy being much preferable to any other. The pin which runs upward through the center of the round disk is made especially strong; and has at its apex a bevel gear. A corresponding bevel gear connects this to a horizontal rotating rod, the opposite end of which constitutes the

(Concluded on page 218.)



The solenoid motor that drives the moving picture machine.

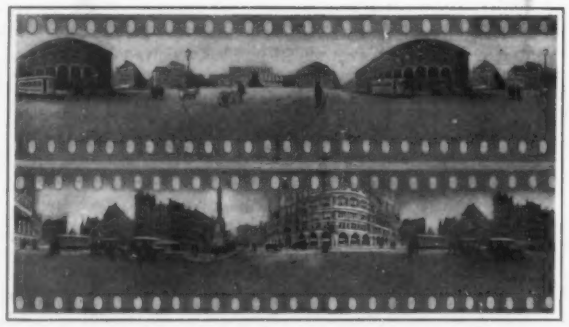
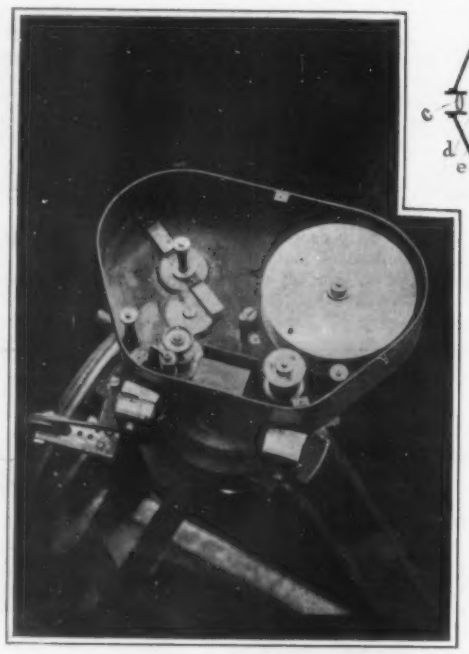


Fig. 2.—Sections from a panoramic film.



Interior of the experimental apparatus, showing the mechanism.

The experimental panoramic moving picture camera.

Moving Picture Panoramas

By Dr. Alfred Gradenwitz

HOW interesting it would be to combine the panorama's illusion in space with the moving picture's illusion in time! Why not have "animated panoramas"?

As far back as fifteen years ago, a French inventor designed a "kinetorama," destined to project such panoramas on the walls of a circular hall, but the method used, a battery of ordinary kinematographs, each covering a given portion of the circumference, was too complicated to be adopted in actual practice.

A Bavarian engineer, Dr. Hans Goetz of Munich, has simplified the problem by using the ordinary moving picture camera suitably modified.

Ordinary panorama cameras are known to be based on the rotation of an objective round a vertical axis, this objective recording on a semicircular film a panorama covering an angle of 140 degrees as a maximum. Another type of panorama camera is arranged to rotate round its stand, while a film in its interior passes in front of the slot.

The accompanying diagram is a top plan view of such an apparatus: *a* is the vertical axis around which the camera *b* rotates. The objective *c* comprises an adjustable slot *d*, below which a film *e* is arranged to pass under the action of a gearing controlled by the axis, while unwinding from drum *f* on drum *g*.

When this apparatus is made to rotate once round its vertical axis, the whole panorama is reproduced photographically, or, as it were, unwound, on the film. However, it suffices to provide for a continuous rotation at a speed corresponding with the normal rate of moving picture projection (that is, about fifteen revolutions per second), in order to produce a most unexpected conversion, and to transform the camera into an ideal panorama kinematograph. The pictures thus obtained, at first sight, do not seem to have anything in common with moving-picture films, and are nothing but a panorama continually unwound, comparable to a wall-paper border (Fig. 2). However, on examining the panorama more closely, the pictures are seen to differ from one another, any moving objects occupying more or less different positions, as on the sections of an ordinary kinematograph film. In fact, the only distinctive feature of the panorama film is the substitution of a single, continuous picture for an intermittent succession of film sections.

This picture has to be projected on the walls

(Concluded on page 218.)

Fighting the Fly in the Interest of Public Health

The Story of a Successful Crusade in Cleveland Against Flies

By Jean Dawson, Ph. D.

A WEATHER vane indicates the direction of the wind no more certainly than flies in a neighborhood indicate the presence of hidden filth. Flies were unequally distributed throughout Cleveland, and we rightfully attributed it to the difference in the amount of débris that was allowed to gather in different parts of the city. We had, however, little first hand knowledge of the sanitary condition of any neighborhood, and we determined in the early spring of 1913 to find the sources of flies in the city.

For six weeks we investigated neighborhoods in different sections of the city, making a house to house canvass and learning of conditions which were of inestimable value to us later. In the disposal of garbage all grades of civilization prevailed among householders, which was not always bounded by geographical lines; roughly speaking, Cleveland is divided into two distinct classes, those who place their garbage in some kind of a receptacle and those who do not. The receptacles used vary from a galvanized can covered tightly and placed in the rear of the lot, to the can without top or bottom, the improvised soap box, peach basket and paper sack, which allow the garbage to become scattered about the yard, emitting offensive odors which are most attractive to flies.

Those who do not use a receptacle feed the garbage to their chickens, or toss it from a convenient door or window and allow it to ferment and decay in the yard. Collectors have strict orders not to take any garbage that is not in some kind of a receptacle, or that is mixed with rubbish. The writer has seen tell-tale paths of greasy filth running down the side of a house from the window to the ground, showing where the inmates have thrown the household waste—from tablescraps to the feathers and entrails of chickens.

Do flies breed in garbage? Truly, a veritable paradise for fly feeding and breeding! Fortunately the millions of eggs and larvæ found in exposed garbage are killed at the garbage rendering plant before they can develop into flies. It is only in outlying districts where collections are infrequent and where it is allowed to lie upon the ground for more than a week that flies successfully breed in the garbage of Cleveland.

While only about five per cent of the flies of the city breed successfully in garbage, it is clear that an educational campaign is necessary to bring about a more sanitary deposition of the waste of our kitchens, the odors of which bring flies about homes and stores in large numbers, wherever garbage is exposed. Now, fermenting organic waste is the only food upon which the larvæ or young of a fly can live, hence it is necessary that a mother fly find such débris or she fails to perpetuate her kind. With the disposal of the sewage and the collection of the garbage, the city of Cleveland has gradually narrowed down the breeding grounds of the house-fly until it has but one left, i. e., the manure from stables. It was about the horse stables (about 5,000 in number) that fully 90 per cent of the flies of the city were breeding, and it was to the removal of the débris from these stables at least once a week that our attention was directed.

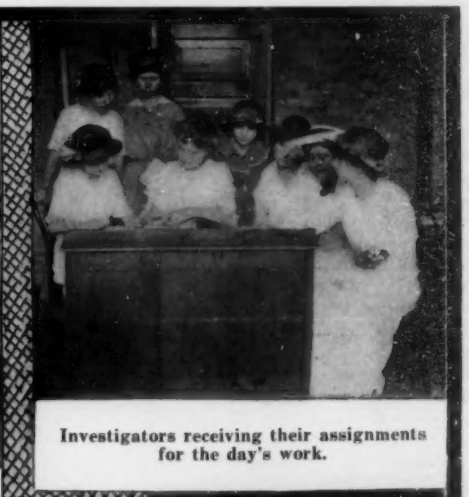
About the time school closed the appropriation committee of the city council gave the campaign a great impetus by placing the sum of $2,000 at our disposal. The money, which was to be drawn by us through the street cleaning department, enabled us to do systematic inspection, which otherwise would have been impossible.

Normal and College Girls Become Inspectors.

Fortunately the help problem did not enter to complicate matters. A body of young women trained in practical biology, in college and Normal School, rallied to our call, and soon thirty enthusiastic inspectors left the office of the anti-fly campaign headquarters daily at 8 A. M., returning with their reports at 4 P. M.

Watching thousands of flies hatching in a stable box near the market.

The young women, trained in practical biology in college and normal school, who assisted in the work.



Investigators receiving their assignments for the day's work.

The junior sanitary police sold many fly traps.

Twenty-two stable shacks where horses are kept under most unsanitary conditions.

This fruit vender maintained a fly trap all summer.

Fly traps placed on the roof of the porch of the old market.

Fly traps on vacant market stalls.

Garbage and rubbish allowed to collect and decay in back yards.

FIGHTING FLIES IN CLEVELAND

Their work seemed to meet a much felt need in the city. Soon a deluge of complaints and calls for help to rectify unsanitary conditions bespoke the interest the people felt and plunged the workers in the anti-fly campaign into a whirl of activity that did not abate throughout the summer.

Much of the success of the campaign is due to the indefatigable work, courage, and pluck displayed by these young women. Teachers to be, they distributed much biological knowledge while on their trips; in return they gained much first-hand information of the city and conditions of the homes, which will be of inestimable value to them in their future work of instructing the young in the ways of better living.

About the middle of July we made a thorough canvas of the city. About thirty girls working in pairs tramped eight hours a day in the hot sun, often footsore and weary, but with no thought of abandoning the difficult task. Through their untiring efforts we obtained a fairly complete record of the stables on each street, avenue, and alley in the city, with the number of horses in each, whether there was a box for the stable refuse, and most important of all, how often the box was emptied and by whom.

This information was not always easy to obtain. Horses were sometimes kept in the most unusual places; in the rear end of a store, in a shed back of a house where the horse had to go through the house in order to reach its stall, and even in houses themselves. Stepping to the door of a house in one of the most congested parts of the city one day, the writer saw a couple of horses in one end of the living room and at a table near by a woman washing her dishes. Nor was the inaccessibleness of stables the greatest difficulty—stable owners who could not speak English—those who were naturally suspicious or reticent about giving out any information upon any subject, often taxed good nature to the uttermost.

Investigation showed that general neglect characterized the conditions of the stables throughout the city. North, east, south, and west, stable refuse was allowed to accumulate, usually in heaps upon the ground without even a board to keep it from becoming scattered over the yards. Nor was this condition found in the poorer districts alone; stables back of Euclid Avenue stores and those back of grocery and hardware shops in some of the most select residential sections of the city were not cleaned in weeks and even months.

Usually the presence of a fly in a neighborhood indicates that organic filth is not far away. It was interesting to see how skilful the girls became in locating a neglected stable by the presence of flies, sometimes when even people were not aware of the presence of a stable in their neighborhood.

Law Not Enforced.

No sooner had we discovered the unsanitary conditions of the stables than we began a search for remedial measures. An ordinance passed years before, but never enforced, made it mandatory upon the part of a stable owner to provide a suitable box, and to remove all stable refuse every seventy-two hours.

To get the stablemen to provide boxes was comparatively easy. During the summer hundreds of boxes were built following our complaints. The removal of the stable refuse, even once a week, however, was an entirely different matter and involves work that is yet to be completed before we can reach our ideal, "A Flyless City."

Almost the first stable owner asked to comply with the law brought out the reason why the ordinance had never been enforced. "Yes, I'll remove the manure from my stable box once a week and be glad to, if you will tell me where I can put it. I had a farmer who promised to haul the manure from my stable, but he is too busy to bother with it in the summer." Unconsciously, this man summed up the difficulties of the situation in a few words. The city had provided no places for the disposal of manure, and we could say nothing in answer to the man's inquiry. To be sure we might have been unreasonable enough to tell him to hitch up his horse once a week and draw a mere wheelbarrow load (the accumulation from one horse for a week) miles and miles to the city limits. If he did not care to do this we might have told him to pay the customary $3 a load to an expressman once a week to remove the manure. Clearly the law was unreasonable.

Not only did this stable owner voice the difficulties in the way of removing the refuse from the city once a week, but his experience typified that of nearly every small stable owner of Cleveland. Considering the time and expense involved in removing manure, the stable owners were glad to turn to the farmer for aid. To be sure manure is a valuable fertilizer, and the farmer would collect it some time, provided of course there was a load and he could come for it when it suited his own convenience. From the health standpoint this haphazard collection of manure defeats its own end. Flies pass through their life history every ten days during the summer, and the removal of the manure after the flies have developed reminds one of the man who locked the barn after his horse was stolen.

One cannot blame the farmer for this neglect in the summer-time when his crops call loudly for attention. Some prosperous farmers needed so much fertilizer that they employed men to collect the manure the year 'round, even paying a nominal sum to the stable owners for the privilege of collecting it. This fact explains why our records show that the manure from larger stables is collected nearly every day.

It was clear to us if the law was to be enforced it must first be made reasonable by furnishing places where manure might be loaded on cars and carried out of the city. Accordingly we wrote to the different railroad companies asking for the location of all possible switch tracks where manure might be loaded. From the answers received we chose seven stations, so situated that few men would have to haul their stable refuse more than a mile. We then divided the stables of the city into seven lists according to their proximity to one of these stations.

Disposal of Stable Refuse.

No sooner was it known that we were contemplating shipping this fertilizer than a shower of orders for manure by the carload came from farmers from the surrounding country.

We now had the shipping stations and possible customers; the remaining work to be done was to get the manure loaded into the cars and shipped out of the city before the flies could develop. Had the city had sufficient money to take up the collection of the stable refuse as a municipal activity, as it had taken the garbage, Cleveland would have attained to "flylessness" with little or no further effort on the part of its inhabitants. This, however, was not to be, for Cleveland has debts that forbid further undertakings, at least for some years. Meanwhile without the financial aid of the city, we must get this refuse to the country and moreover it must be put on a paying basis.

That there is science in all trades we soon demonstrated. The street cleaning department gave us teams and men to work in several stations until we could establish a private collection. These men were hired at $4.80 a day and they collected two and sometimes three small loads, not amounting to more than two or three tons of manure. We were selling the fertilizer at 75 cents per ton free on board, and, of course, losing heavily on every carload. For that matter so were the men who volunteered to collect with a view of taking up the business permanently.

We soon learned that our failure was due mainly to the fact that we undertook to collect from all stables, large and small alike, once a week. A little figuring taught us that this could not be done, at least not in the case of the small one and two-horse stables. Government estimates show that the manure from a single horse stable amounts to between 5 and 6 tons a year. Estimating the price of manure at even a dollar a ton free on board would make the manure produced in a stable for a week amount to between 9 and 10 cents. It was clear why we failed: no one could collect from a one-horse or even a two-horse stable every week for the price of the manure itself.

That the collection of manure could be made to pay was demonstrated by Mr. B., a man in the market region, who had been in the business of shipping fertilizer to farmers for several years. Mr. B. kept eight and ten teams busy, and was prosperous enough at least to own his own switch-track in the very heart of the city. He had been collecting from the larger stables once or more a week and from the smaller stables once or twice a year—whenever there was a load. We also learned that Mr. B. paid his men by the ton and that each man brought in four and five large loads a day as against our two and three small ones, when we paid by the day.

As soon as we began to enforce the law, Mr. B. was told that he must collect at least once a week from all stable-men with whom he had contracted, and then our inspectors warned the smaller stable-men that once a week they must either pay some one for hauling their stable manure or else haul it to the car themselves.

At first many of the stable-men did not take our efforts seriously. We would warn men that they were violating the law, and a week later when we went back we would find that nothing had been done. This state of affairs went on until, growing desperate, we appealed to the city attorney for help. After due study of the situation, he told us that as citizens we had a right to complain of the violation of the law and advised us to send our complaints to the police court direct.

When this fact became known, almost all the delinquents were willing and anxious to comply with the law. Ten carloads of manure instead of eight were taken from the market district weekly. Only a few neglected stables remained, but unfortunately they were enough to supply the entire district with flies. Even the owners of these stables, however, promised to comply with the law after being called into the police court and golden-ruled. That these men kept their word and cleaned up was strikingly demonstrated by the almost magical disappearance of flies from the entire market district.

The work of cleaning stables done in the market district remains as the ideal for all parts of the city, to accomplish which is a work for future campaigns.

Protecting the Central Food Supply.

It is of small use to urge the elimination of flies from the retail stores if the food is contaminated before reaching them. For this reason much effort was used to keep flies from the market and commission house district.

With the approach of warm weather we were comforted with the thought that at least we should not have to fight a countless number of possible offspring from the 50,000 flies that had met a timely death during the winter campaign. We could not, however, congratulate ourselves that we had killed the last pair of flies or that there was any lack of organic débris in which flies might breed, in the city. Not to be caught unprepared, we started the work of protecting the city's food supply in the markets and commission houses before the summer had well begun. This is by no means an easy task; first, because the odors of food are attractive to flies, and second, because the markets and commission houses of Cleveland are situated in the oldest and most congested parts of the city. The unfavorable location of these buildings did not, however, discourage us. It was here that we determined to apply the acid test to our methods of fly extermination. In this section of the city, we put forth our supreme effort, and it was here that we gained our best results and worked out the plans for all future work in eliminating flies from the city.

In this, the most congested section of the city, with its varied business interests, its crowds of humanity living in houses, the condition of which is absorbing the attention of the city's experts, the flies disappeared so completely at the very height of the fly season (the last of August and September) that a broken melon might lie in the streets for hours and not have a fly appear to feed upon this most favored food. The unscreened windows and doors of the markets stood wide open, and so few flies made their appearance that were it not for the sultry heat, one might have imagined that it was early spring or winter.

These results crowned the efforts of weeks of the most tireless labor in the trapping and poisoning of flies and in the clearing away of the fly-breeding places.

The winter campaign was barely over, before we began catching flies on their way from their breeding grounds to the markets. With the aid of the alderman of the ward, we found merchants and restaurant keepers who were willing to keep large traps baited in front of their places of business, provided we furnished the traps. All summer long dozens of traps, baited with vinegar and sugar, beer and stale fruit took up flies from the neighborhood as a vacuum cleaner takes up dust. These flies were prevented from entering the markets or going back to the fermenting débris to breed new generations. These traps proved a benefit not only to the merchants who baited them, but to the entire community as well.

Later, to demonstrate to the general public the efficiency of trapping flies, we placed large traps before the fire and police stations throughout the city.

Up to the middle of July, we could count at no time more than 10 to 50 flies, in either of the large markets; later, however, they became more numerous, breeding in stable manure not over a stone's throw away.

Theoretically, starting the day with a flyless market is easy; practically it is most difficult. Traps baited with an attractive bait or poison set about in a clean, dry market resulted in a speedy elimination of flies. Success depended upon the food in the trap being much more attractive to the flies than that to which it had access on the outside, or upon the fly being hungry and thirsty and the trap containing the only available food.

Open daily, the Sheriff Street market was successful with the first of these methods. At all times large traps, baited with beer and bread were kept upon a central stand, and on Sunday, when no food was exposed, plates of poison were placed about the market. The Central market had no room for traps and depended upon getting rid of flies on the days when the market was not open to the public. The time for catching flies being limited, it was necessary that every merchant should leave his stall clean so that on the off-market days the flies would become hungry and rush into the traps for food. Herein lay a difficulty.

Merchants hitherto had cleaned their stalls at their convenience. Sometimes the débris of Saturday was not cleaned away until late Monday afternoon, and in the meantime the flies gathered,

growing fat and contented on the débris left on counters, meat blocks, and fish-stands and on over-ripening fruit.

Constant vigilance, which at first required a daily inspection of every stall in the market, brought about a co-operation on the part of the merchants that was productive of best results. The market underwent a change: much scrubbing was done and done on time. Clean floors, counters, and meat blocks soon lent an attractive air to the place, which the merchants were not slow in recognizing as a good business asset. White tile fish-stands took the place of old wooden ones that had for years been an eyesore and furnished a favorite haunt for all of the flies in the neighborhood. With the change in the appearance of the market, there came corresponding changes in the market-men themselves. Dark looks and murmurs about women who interfered with other people's affairs were gradually replaced by friendly nods and later by proffers of advice and plans for still further improving the market.

The fight against the fly and the removal of the filth in which it breeds has passed from a private to a municipal activity. At a meeting of the mayor and his cabinet in the early spring it was decided that the work of eliminating flies from Cleveland was of such grave importance that it should be rightfully assumed by the city as part of the work of the Division of Health in the Department of Welfare.

Wireless Communication in War

FROM time to time in the past the question has been raised as to the efficiency of wireless communication in time of war, and the possibilities of crippling the communications of an enemy have been discussed, but so far in the course of the European conflict nothing bearing on the subject has been reported that has added to our general knowledge of the questions involved. The opinion that apparently has prevailed was that it would be perfectly possible to completely disrupt and suspend all wireless communication by means of interference of very powerful waves of a different length sent out by an enemy, or "jamming" as it is termed; but it would appear from an article by Commander F. G. Loring of the Royal Navy in the *Naval Annual*, that tactics of this kind are by no means successful. The author's remarks on this subject are as follows:

"Interference caused by other stations, such as international interference of an enemy, is of far less importance than is generally supposed. It is an extremely difficult thing to seriously 'jam' a well-organized communication, and there are many ways, both technical and methodical, of defeating such an intention.

"A good deal of misapprehension exists in the minds of the public concerning this question of 'jamming.' It is to a large extent a question of degree, and in the present state of development of wireless teiegraphy it is a far more important problem from a commercial point of view than from a strategical.

"The success of a commercial line of communication depends on the amount of traffic that can be handled in a given time. Interference and atmospherics may exist to such an extent that the service cannot be carried on on a remunerative basis. From a strategical point of view the case is different. It is desired to get a comparatively small number of messages through to some distant point with absolute certainty—messages which in most cases cannot be delivered by any other known means. It is the opinion of the writer that, given good apparatus and a highly-skilled personnel, it is absolutely impossible for an enemy to prevent a wireless message reaching its destination. It is not easy even to delay it for any considerable time.

Ineffectiveness of Intentional Interference.

"As an instance of the ineffectiveness of intentional jamming, I find in a report of the wireless communications of the 1906 Naval Maneuvers the following interesting paragraph: 'No serious interference was caused by intentional or unintentional jamming, though the enemy resorted to this for forty hours without ceasing.' In connection with this question of the possibility of effective jamming by an enemy, it must not be overlooked that by attempting it the enemy is certainly putting his own wireless communication completely out of action for the time being, while it is very doubtful if he is seriously inconveniencing the communications of his more distant opponent. Severe atmospheric disturbances are far more difficult to deal with than interference, and there are undoubtedly times and places when it is absolutely impossible for an operator to receive a message for several hours at a stretch.

Code Messages.

"The danger involved through the interception of a fleet's signals by an enemy is also, in my opinion, often over-rated. Co-operation between operators and full knowledge of each other's methods is extremely important when handling difficult code messages, and the more skilled the organization, the more difficult it is for a strange operator to take down with the necessary accuracy the groups of a code message. He cannot ask for the repetition of doubtful groups, and he has no intimate and daily familiarity with the methods of his opponent to assist him in his task. And, after all, giving the enemy every advantage, giving him a perfect record of the signals, the key of the code to his hand and equal facility of skill and language to translate it for use—a most improbable combination, it must be admitted—he has still failed to prevent the all-important information reaching its destination."

Payment of Patent Fees Abroad

THE transmission of money for the payment of patent fees abroad is of much interest to inventors, and has had the attention of the Interior Department and the Department of State. As a result of correspondence between these departments, it is understood that the State Department has transmitted a note to each of the countries with which communication is now more or less interrupted, setting forth that American citizens have called the attention of this Government to the necessity of making payment of taxes upon or to secure the filing or amendment of patent applications or of working patents within specified time in order to maintain rights in the various European countries and suggesting a reasonable extension of the time limits.

The desired action has been anticipated in some countries, France, for instance, having issued a decree suspending from and after August 1st, 1914, the periods granted to holders of certificates of guaranty issued on the occasion of expositions organized in France at the instance of the administration or under its patronage to claim the protection of which their discoveries, designs, models, or trademarks are legally susceptible; also suspending the period during which a person depositing a design or model is entitled to require the maintenance of his deposit either with publicity or in secret form; and suspending from and after August 1st, 1914, and until a date to be fixed by a decree upon the cessation of hostilities the legal periods within which holders of patents must pay the annual taxes upon their patents. The suspension is applicable to the payment required to be made upon the filing of any application for a patent of invention or certificate of addition and also suspends the period of working of a patented invention in France. The provisions of the decree are not applicable to patents which prior to August 1st, 1914, had become forfeited. Periods fixed by the German patent office for actions on pending applications have also been extended.

It is also understood that certain extensions of time for the payment of patent fees are provided for by a decree in Sweden and that certain extensions are contemplated in Austria and Hungary.

Motion Pictures in Schools

A WRITER in *School Science and Mathematics* reports in detail the extensive and varied use now made of motion pictures in American schools. The following cases are illustrative: At the Sheffield Scientific School (New Haven) an exhibition of "The Story of Pig Iron" was so successful that the authorities are negotiating with other firms for pictures along scientific lines. The Kansas University Extension Department has a series of films teaching lessons in morals for the use of the Kansas public schools. Fitchburg, Mass., also uses moving pictures for moral instruction in schools. The school authorities at Parsons, Kansas, have a contract with the manager of a local theater to give special performances for school children two Friday afternoons a month, the films being selected by the superintendent. The United States Military and Naval academies both use motion pictures. Domestic science is taught with the aid of motion pictures at the University of Minnesota. Minneapolis and St. Paul use motion pictures in the public schools to teach geography and history.

The Current Supplement

THE current SCIENTIFIC AMERICAN SUPPLEMENT, No. 2019, contains an unusually varied assortment of interesting, valuable, and timely articles. Lighthouses for the navigation of the air discusses a practical problem of which little has been written, and gives a chart and list of the light stations that Germany has already established for the guidance of her airships in time of war. The article on heredity is the first instalment of the address of Prof. William Bateson before the British Association for the Advancement of Science, which is published in full, and is a discussion of the principles of evolution and the secret of life that will be read with keen interest. A sketch of Prof. Bateson's history is also given. Numerous examples of results secured by the use of the new Coolidge X-ray tube show the new power that has been placed in the hands of scientists. A new way of selling will interest every business man. Other articles tell about the manufacture of ice; navigation without logarithms; liquid crystals and biology; and many other valuable topics.

Correspondence

[The editors are not responsible for statements made in the correspondence column. Anonymous communications cannot be considered, but the names of correspondents will be withheld when so desired.]

Our War Number

To the Editor of the SCIENTIFIC AMERICAN:

A war number! As if it were really the first time the SCIENTIFIC AMERICAN has included a war number.

When war was declared about a month ago, I for one pulled out back numbers of the SCIENTIFIC AMERICAN and also looked up the war section of the reference book, and found out more about the ratings of the belligerents and their equipment than I have since found from dozens of periodicals.

The SCIENTIFIC AMERICAN must have had *inside*-tuition about the war, for I found articles about the possibilities of a Zeppelin attack on London, the guns of the warships, the Kiel Canal, etc., of only a few months date back. Being peaceful, I had "skipped" most of these articles when they came out first, as they seemed to have little interest then.

A *peace* number ought to follow soon.

Minneapolis, Minn. ANONYMOUS.

Technical Writings by Untechnical Men. A Defense.

To the Editor of the SCIENTIFIC AMERICAN:

My attention was recently called to a letter published in your esteemed publication, entitled "Technical Writings by Untechnical Men," signed by Mr. Charles S. Rindsfoos, secretary-treasurer the Foundation Company, New York. In this letter Mr. Rindsfoos caustically criticizes an article by me, entitled "Skyscraper," which appeared in the May issue of the *Atlantic Monthly*, and protests that any than technical men should be permitted to record impressions inspired by great engineering accomplishments in any but technical words and phrases.

Such literary criticism by unliterary men cannot be ignored, as is my natural inclination in this instance. The discussion Mr. Rindsfoos opens is a wide one. Were he and others of his mind to dictate, literary and artistic endeavors must perish, unless writers and artists limit their efforts entirely to the daisy of the field and the color of a woman's eyes.

That I have failed to label with exact technical phraseology certain materials that entered into the construction of the building I ignore as childish querulousness. That I have seen certain things and received imaginative impressions in the amazing construction of this great building that Mr. Rindsfoos cannot see nor feel is important, for here is defined the purpose of my article, the purpose of any purely descriptive writing or painting.

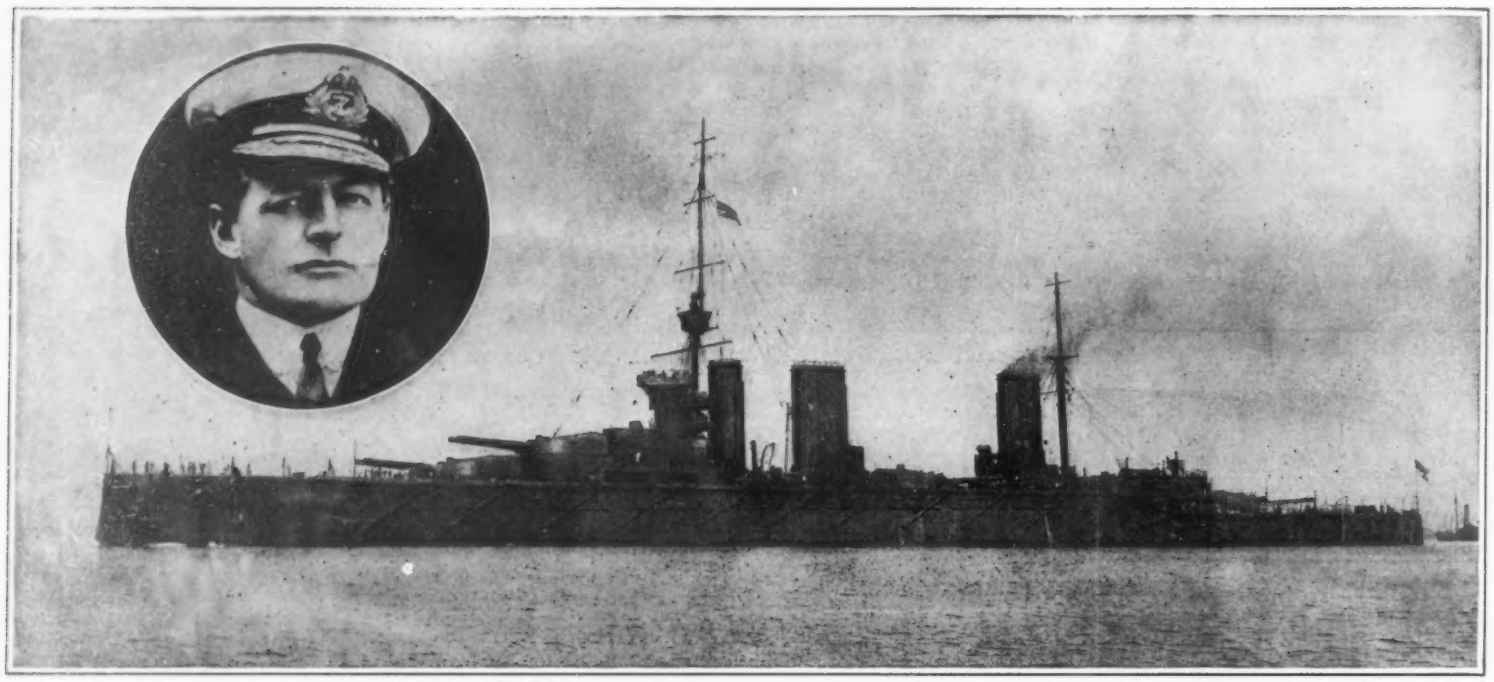
I must beg to advise my critic that my purpose was not to afford a technical description of the building of an American skyscraper from which anyone might construct a similar edifice; no more than was it Mr. Pennell's purpose in the Panama lithographs to offer working drawings for the digging of future canals. Mr. Rindsfoos confuses literary descriptions with technical specifications; paintings with blue-prints. That he prefers in each case the latter is natural; that he fails to see anything of value in even the intention of the former, fails in fact, to see the former at all, is regrettable, but it is not given to all to see clearly.

Mr. Whistler, an artist of recognized reputation, once painted a picture of Battersea Bridge. At a certain famous trial during Mr. Whistler's lifetime this picture was produced as evidence, and the question was asked by someone present, "Which part of the picture is the bridge?" I am citing this rather extreme case to prove to Mr. Rindsfoos that, if he intends a critical journey through the fields of art and letters, he must be prepared for more disturbing lines, colors, words, and phrases than he has yet encountered.

Should Mr. Rindsfoos care to continue his literary criticisms further, I would suggest that his condemnation of a poem entitled "Paracelsus," by the late Robert Browning, would be of extreme interest and might tend still more definitely to establish Mr. Rindsfoos's exact place in the fields of artistic and literary criticism.

And may I add in closing that, when next my worthy critic descends into that sweet atmosphere of his caissons (which he defends so vigorously), and descending catches one last glimpse of the sunshine touching the great walls of the city, and the "wisps" (I will use the word) of steam blown back from stack and chimney like soft plumes bending before the morning breeze, let him remember that life is not all dry dust of technicality, and that imagination is even sometimes responsible for the building of those very foundations in which he so closely dwells. JOSEPH HUSBAND.

Winnetka, Ill.



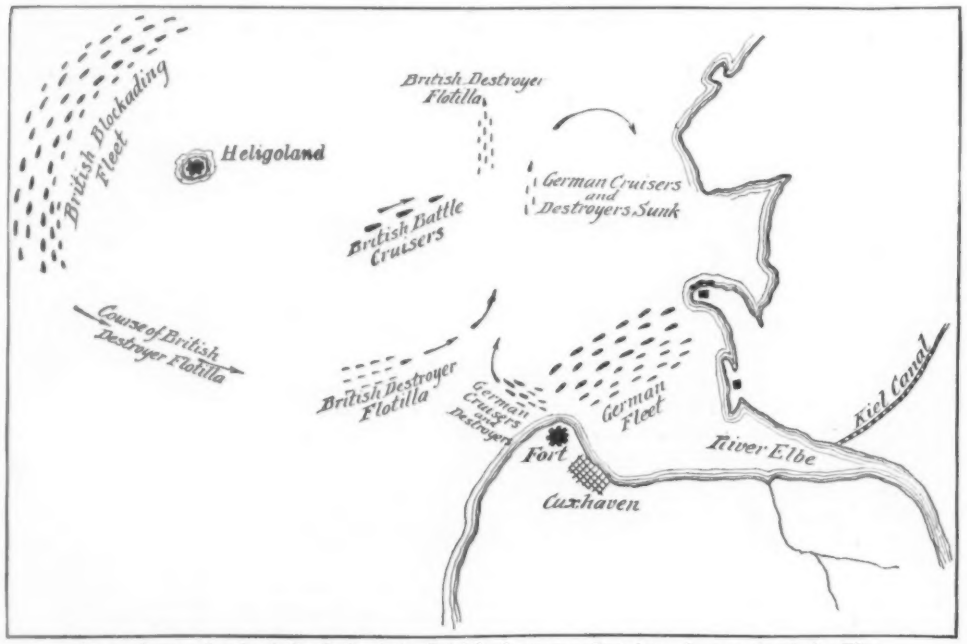
Admiral Sir David Beatty and the battle-cruiser "Lion," which gave the "coup de grace" to the German cruisers.

First Naval Engagement of the War

Five German Scouts and Destroyers Sunk at the Mouth of the Elbe

THAT was a thrilling naval fight which took place August 28th between Heligoland and Cuxhaven. Heligoland is a strongly fortified island, off the mouth of the Elbe. It forms the base for the German North Sea destroyer fleet. The island is strongly protected with the most modern coast defenses—heavy long-range rifles, mortars, quick-firers, and mine fields. Similar defenses exist at Cuxhaven, and on the opposite shore of the Elbe.

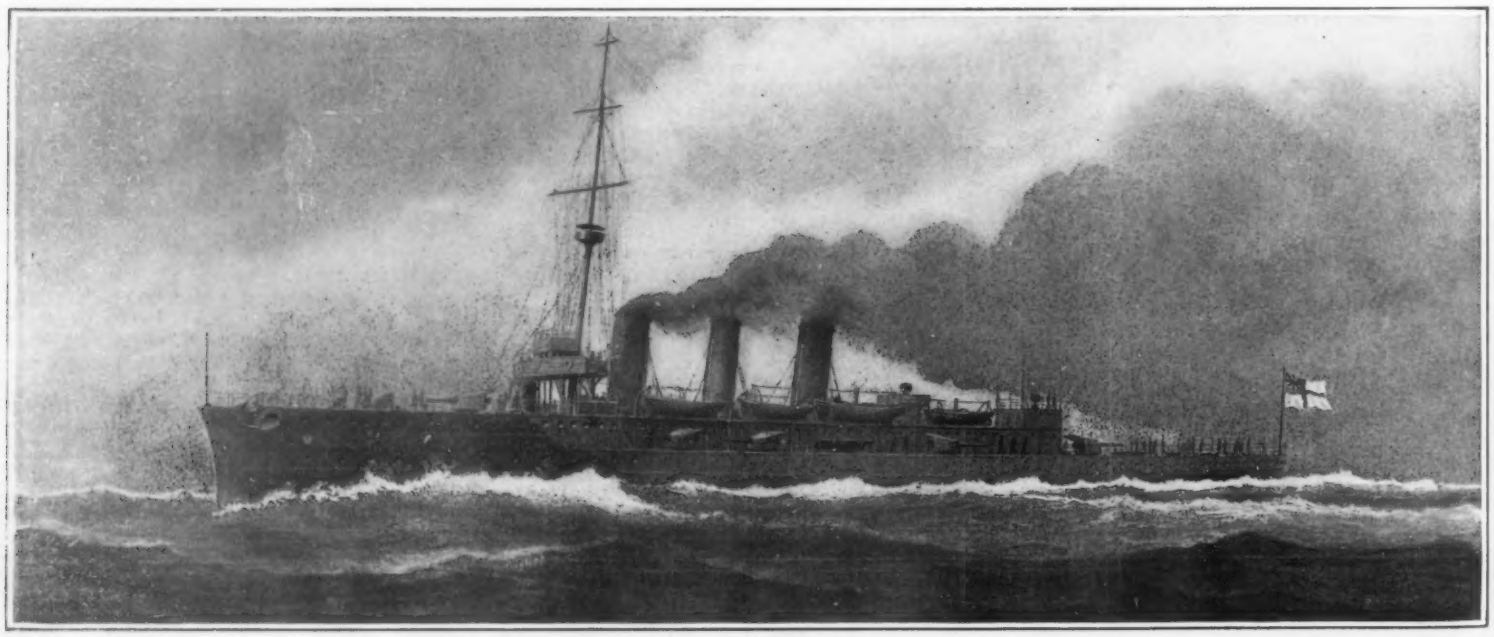
It is now well established that a part of the German fleet has fled for refuge in the broad estuary of the Elbe River, behind the guns of its coast fortifications. These protected waters are probably the rendezvous of those destroyer flotillas with which it has been supposed that Germany, in the event of war, would threaten the coasts of England and make successful raids against any British fleet operating in the North Sea.



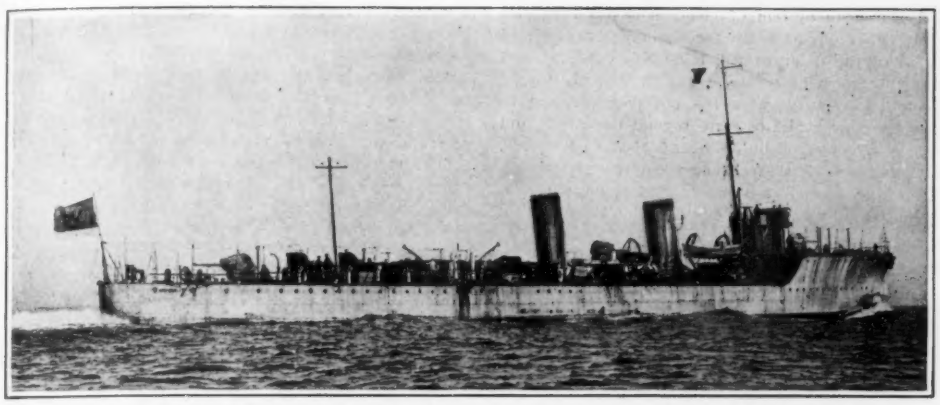
Approximate sketch of the dash of the British destroyer fleet into the mouth of the Elbe.

Failing any attack by Germany, the British admiral decided to send in a force of destroyers to draw the German destroyers and scout cruisers out into deep water, and, to quote the official report, "engage them at leisure in the open sea." The ruse was successful, and the daring dash into the zone of fire of the coast fortifications resulted in a sharp fight, in which three of the fast scout cruisers of the German fleet and two destroyers were sent to the bottom with some eight hundred of their crews, without the loss of a British ship.

The British naval constructors are particularly pleased with the fact that the light armored cruiser



The British 30-knot scout cruiser "Arethusa," which led the destroyer attack off Heligoland.

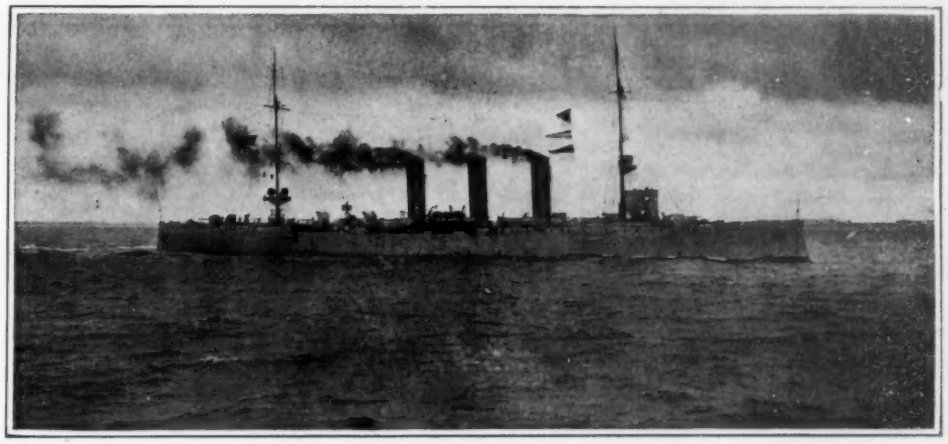


Date, 1914. **Tons,** 960. **Speed,** 35 knots. **Guns,** three 4-inch. **Torpedo tubes,** 4.

The "Laurel," one of the British destroyers sent in under the guns of Heligoland to lure the Germans into the open.

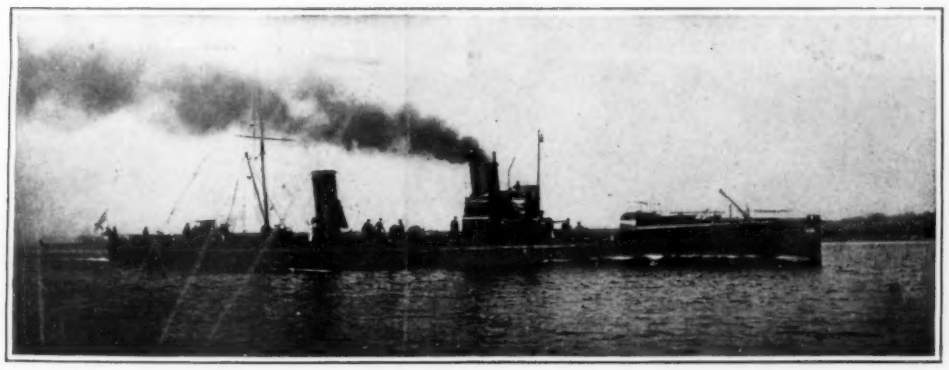
"Arethusa," a new 30-knot type, which had been in commission only a few days, after an engagement of twenty-five minutes at 3,000 yards with two German cruisers, was able to drive them off. Later, she was attacked by two other German cruisers, the "Köln" and "Mainz," of 4,350 tons, 27 knots speed, and contributed to the sinking of the "Mainz." The "Arethusa," which flew the pennant of the commodore in command of the First Fleet, and carries 2½ inches of side armor, and a battery of two 6-inch, four 4-inch guns, and four 21-inch torpedo tubes, led into action a destroyer flotilla composed of some of the latest British ships of that type. We illustrate one of these, the "Laurel," built in 1913, 960 tons, 30 knots speed, armed with three 4-inch guns and four 21-inch torpedo tubes.

The object of the British movement was to get the German fleet to do a little fighting. A month of the war has passed by; and it cannot be said that the activities of their ships have been of a character to shed any peculiar luster upon the naval forces of Germany. The principal achievements of the fleet have consisted, in spite of The Hague Convention, in strewing some of the most frequented highways of peaceful commerce with



Date, 1910. **Tons,** 4,350. **Speed,** 27 knots. **Guns,** twelve 4-inch.

The 27-knot scout cruiser "Mainz" and sister ship "Köln," sunk by British in the Heligoland fight.



Date, 1911. **Tons,** 650. **Speed,** 32.5 knots. **Guns,** two 4-inch. **Torpedo tubes,** 5.

Two of this "V" class of German destroyers were sunk in the Heligoland fight.

floating mines of a forbidden type; indeed, the triumphs of the German navy, thus far, have consisted more than anything else in the sinking, by mines, merchant ships of all nations, steaming, peacefully, on the regular trade routes of the merchant service.

The world has heard so much about the surpassing qualities of the German torpedo service, that we cannot but feel there must have been a growing wonderment in the British blockading fleet that the Germans should not have scorned to remain supine under the fortifications of Heligoland and Cuxhaven, but rather should have preferred to assist their hard-fighting army by venturing forth in an effort to stop the transportation of a British army to the Continent.

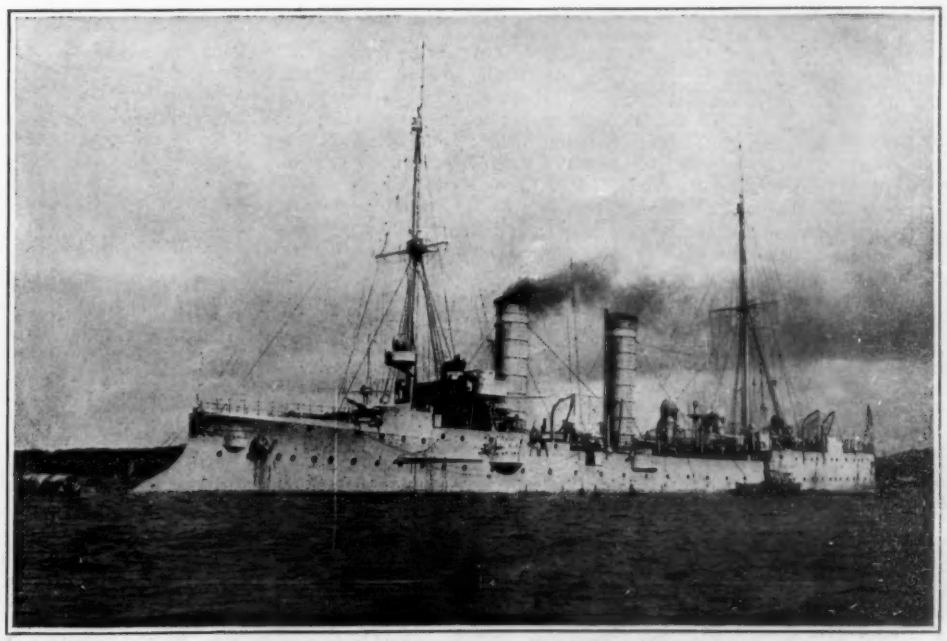
Whatever the predisposing cause, we now know that the British determined to "trail a red herring," if we may be pardoned the use of a term so unnautical, across the front of the blockaded German fleet. Hence, the dash of the "Arethusa" and "Fearless" with a fleet of destroyers past the guns of Heligoland.

The bait was too tempting not to be swallowed, and several German cruisers with a flotilla of destroyers dashed out to seize so easy a prey. The British, spoiling for a fight, did not hesitate to give battle against superior numbers, and for twenty-five minutes the two cruisers and the destroyers fought, under odds as great as those against which, a few days before, the British held the Germans at bay for four days and remained unbroken in the north of France. Following their plan of operations, the British drew away to the open and out of the shelter of the Heligoland fortifications, making a fight against odds which must go down as one of the brightest instances of pluck and daring in the annals of naval warfare. When the Germans had been drawn into the open, the British battle-cruisers of the "Lion" type, fulfilling their part of the programme, swept down and sank three German cruisers and a couple of destroyers with a few well-placed shots.

The importance of this brilliant little fight is not to be measured in terms of the loss of men and material; although the German fleet was reduced to the extent of three of its crack scout cruisers and two destroyers; its chief significance lies in the showing of the relative maneuvering abilities, strategy, and gun-fire of the two fleets.

This was the first time that the brand-new German fleet had a chance to show its qualities, at least in a sea fight involving numbers; and it must be confessed that the failure of four light cruisers of greater size to sink the "Arethusa" and dispose of the destroyer fleet would seem to suggest that German naval gunnery has room for improvement.

It is about time for the German navy to be doing something. The army has made good by violating the neutrality of Belgium, to which the honor of the German nation was pledged, and rushing an army in overwhelming force across the unfortified frontier of northern France; and the world at large, and surely the German people themselves, are waiting for the great German dreadnought fleet to show what it can do in a battleship engagement, when the tables are reversed and the advantage of numbers is with their opponents.



Date, 1901. **Tons,** 2,660. **Speed,** 21 knots. **Guns,** ten 4-inch. **Torpedo tubes,** 3.

The German cruiser "Ariadne," sunk in the Heligoland fight.

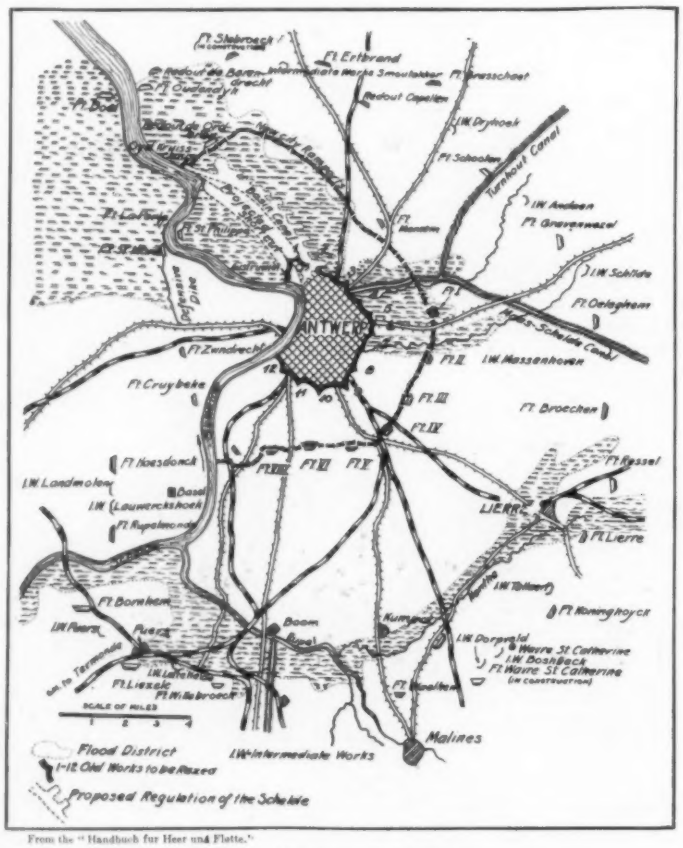
Asphalt Paper Pipes

IN Austria pipes made from a special grade of German asphalt paper have just been introduced with promise of great commercial popularity. They are light and slightly flexible, with the great advantage that there is no electrolysis from stray currents and no rusting. The patent owners, the Anglo-American Bank, insist that this piping can replace pipes of iron, copper, and clay for all purposes except carrying hot liquids, concentrated acid and petroleum products.

Antwerp and Its Defenses

IN 1859 Antwerp began the reconstruction of her defenses under the direction of Brialmont. The old ramparts were removed and the Alba citadel was razed in 1874. But in 1869 it was found that the new enceinte and the chain of eight forts surrounding it on the right flank of the Scheldt (numbered I to VIII in the map) no longer met the requirements of the day. On the right bank Fort Merxem was added on the north; on the left bank Forts Cruybeke and Zwyendrecht were built. In 1877 work was begun on a new and advanced line of fortifications (Forts Waelhem, Lierre, Rupelmonde, Schooten, Cappellen and Duffel), which were intended to protect the passages across the Rupel and the Nethe.

After parliamentary discussions which lasted for years it was decided on January 24th, 1906, to remove the city ramparts built by Brialmont, and to rely upon the inner line of forts. Fort VIII was to be removed, and the inner line of forts was to be connected with a line of defenses, which was to be continued to Fort Merxem, and over the Redoute de Orderen to the Scheldt. The long northeastern line will lie parallel with the canal that is being built to straighten out the river and with the harbor basin to be constructed on the right bank. The old fortifications, which in 1909 it was decided to remove, constitute the first engineering district, whereas the new fortifications in the northern part as far as Fort IV constitute the second, and the southern portion the third. The new circle of forts will complete those built since 1870, and will lie considerably in advance of these. To the north they will lie four kilometers, to the east more than eight kilometers, and to the south more than twelve kilometers from the new ramparts, since they extend so far beyond the River Nethe and Rupel that they will not prevent offensive operations. The northeastern section extends from the lower Scheldt as far as the Turnhout Canal and embraces besides forts Stabroeck, Ertbrand, Brasschaet, and Schooten, the intermediate works of Smoutakker, Cappellen, and Dryhoek (fourth engineering district). The fifth engineering district extends as far as the great Nethe with the forts Gravenwezel, Oeleghem, Broechen, Ressel, and the intermediate works of Andaen, Schilde, and Massenhoven. The sixth engineering district extends to the Dyle with the forts Lierre, Koninghoyck, Wavre, Ste. Catherine, Waelhem, and the intermediate works of Tallaert, Boschbeck, Dortpveld, and Duffel (railway redoute). The seventh district extends to the upper Scheldt and includes forts Willebroeck, Liezele, Bornhem, and the intermediate works of Letterheide and Puers. Six forts and five intermediate fortifications were to be erected on the left bank of the Scheldt, between Doel and Steendorp (Rupelmonde until 1908), in order to complete the ring; but for the time being the Belgians decided to content themselves with the two forts Steendorp and Haesdonck, as well as with the intermediate works, Lauwerckshoek and Landmolen. This leaves a wide gap which interferes seriously with absolute protection against the bombardment. These works together with the more rearwardly lying Cruybeke, Zwyndrecht, and the dike comprise the defenses of the eighth district. The ninth district includes forts Ste. Marie, La Perle, St. Philippe, Doel, and Oudendyk, as well as the old Redoute de Orderen and de Berendrecht; in other words, the works which serve primarily to block the Scheldt. The circumference of the entire ring of fortifications is about 100 kilometers (62 miles).



From the "Handbuch fur Heer und Flotte."

The fortifications of Antwerp.

It was with the utmost difficulty that late Gen. Henri Alexis Brialmont of the Belgian army succeeded in inducing the Belgian government to carry out his plans for the defense of Antwerp, and then only after the Russian general, von Totleben had approved his plans. From the very first the defenses attracted the attention of military men largely because Brialmont had discarded the bastion system prevalent in France and Belgium, and had adopted the polygonal system of the modern Prussians.

In 1883 Brialmont went to Roumania in order to devise the present system of Roumanian defense. Austria objected to his activities, with the result that he was retired. In 1884, however, he re-entered the Belgian service. Under his directions and according to his plans the defenses of Namur and Lüttich were built between 1888 and 1892. In 1892 he left the army and became a member of the Belgian Parliament. In the same year he went to Constantinople in order to give an expert opinion on the fortifications of that town. His suggestions were adopted, but have not thus far been carried out. Brialmont devoted the latter part of his life in urging Belgium to adopt the general European system of compulsory military service. He also fought hotly for the preservation and extension of the defenses which he had designed and built for Antwerp at a time when it was considered advisable to do away with the old defenses and to transfer the new girdle of forts beyond the Rupel and Nethe. Brialmont died on July 21st, 1903, in Brussels.

The foregoing facts are taken from the "Handbuch für Heer und Flotte," a military cyclopedia which is being published by Richard Bong & Co. of Leipzig.

Random Reflections

By Our London Correspondent

THE coercive power which a single idea may acquire is really rather remarkable. I happen to be living in England at present, for instance, and I can think of nothing but the war. Not that my thoughts are continually occupied directly with the war (although in the face of special war editions published nearly every hour that is almost true), but they oscillate about it as a center of attraction. It dominates my thoughts and modifies the intellectual habits of years: so that my random reflections will very possibly be less random than usual.

But this unification of ideas may not be without some compensating advantages. It lights up in a particularly vivid manner certain issues which a scientific man is disposed to take for granted. It leads me to wonder whether certain kinds of scientific research ought not to be proscribed. Take the case of the scientific man who invents a new and powerful explosive. I suppose that to some extent he benefits humanity. Doubtless the very existence of the explosive confirms or contradicts certain theoretical points, and to that extent we, and particularly those gentlemen who live among test-tubes and galvanometers, have our knowledge extended. Also, I suppose engineers who want to remove an inconvenient mountain or so in order to run a railway for an enterprising group of benevolent financiers find the stuff useful. But there is the other aspect of its applications. It makes war more horrible.

Now if war were made horrible to the extent of being rendered impossible, it would doubtless be a desirable consummation. But it is not at all obvious that to leave war possible and to intensify its horrors is a desirable thing. It merely means that the death roll becomes greater. The fact is that in mankind's present stage of partial civilization, certain branches of scientific research are probably more dangerous than beneficial. In olden times it was thought that dreadful penalties waited on men who inquired too curiously into some of the secrets of Nature; and as long as the possibility exists that the fruits of our intelligence may be placed at the service of our primitive savage instincts, this dark menace will wait upon our scientific advances. Brotherly love and election theory, charity and the law of gravitation, should be taught contemporaneously. A trained intelligence and far-reaching scientific knowledge may leave its possessor a brute—equipped. Yes, this war teaches the scientific man humility: it is not in science alone that man can find salvation.

The fact that the application of science to war merely intensifies its horrors leads one to a partial solution of this terrible war question. Let us, for the sake of argument, agree that man is not yet sufficiently civilized to refrain from waging war—that he will not consent, for instance, to substituting an intellectual tussle for a physical one; that he will not let, say, a game at chess decide the issue—then let him at least agree to mitigate the horrors of war as much as possible. Let all nations agree that science shall not be pressed into this service. Then let the war lords pour their millions of men into the field armed with boxing gloves. They could fight to their hearts' content. Strategy, tactics, and the other ingenuities would still have full scope. But instead of death and disablement, widows and orphans, we should have bloody noses and black eyes. A conscript, who in private life is a sedentary clerk, would probably find a European war a healthful and invigorating experience. War would not be quite so unutterably stupid as it is at present; its horrors would have vanished, and it would be nothing like so costly. If serious injuries were still inflicted, the War Office could design improved boxing gloves. They could be of the dreadnought class and have extra padding. Ample scope would still exist for differences in military training. One nation would teach its troops to lead with the left and another would teach them to lead with the right.

This may sound farcical, but really, isn't war at the present day farcical? A farce is a kind of exaggerated comedy, but cannot a tragedy be exaggerated to a farcical point? And war is an anachronism—a frequent element in farces. The glories of war have departed. To fight bravely in picturesque panoply against equally picturesque infidels in far eastern and romantic lands to rescue the tomb of the Christ is something at least poetic. But for a modern educated man to be told that certain people he greatly likes and respects are his enemies, and that he is to fight for some cause he does not understand, but which he views with great suspicion, and that his fighting will in all probability consist in walking over a piece of ground which has been mined and being incontinently blown up—well, it doesn't rouse enthusiasm. People are so suspicious about wars nowadays. One wonders even if patriotism isn't rather stupid. One has the preliminary thrill; there is flag-wagging, the blast of a trumpet, the glorious traditions of the Fatherland, and then this vague but persistent vision of a fat, beady-eyed financier lurking in the background. We have been sold so many times, one becomes wary.

One has the feeling that to be an enthusiastic fighter in a modern war one must not reason too closely. That is why some scientific men don't seem very patriotic. It is so difficult to break life-long habits, and the trick of clear-headedness, once acquired, is not easy to shake off. One could fight wholeheartedly in a war for the end of war, but in no other sort of war whatever. Whatever one's nationality, the country to fight for, if fight one must, is the country whose future intentions are most pacific, which is prepared to do most to foster the arts and the sciences, to develop an increasingly desirable social state, to preach and practice charity and brotherly love, and to strive single-heartedly for universal peace.

Effects of Immigration in France

OWING to the low native birthrate in France there is a continual immigration of a large number of foreigners. While some French people rejoice at this, others fear that it may be a case of the gradual loss to the French race of its distinctive characteristics. The number of foreigners resident in France is about 1,200,000; some are merely temporary sojourners, and of the others a certain number remain celibate. Although the data are not very numerous, Dr. Laumonier, in the *Gazette des hôpitaux*, publishes the results of his researches on this subject, these results being distinctly satisfactory. It appears that the children of these mixed marriages, in their features and the form of their bodies, approach more nearly to the French type than any other in sixty cases out of a hundred in the first generation; in the second generation the French type is found in seventy cases in the hundred and in the third generation in eighty cases. It appears from this, therefore, that the foreign element is gradually absorbed, and that no denationalization is to be feared as a consequence of these mixed marriages.

Real Perils of a Reel Hero

APPEALING as they do to the eye only, motion-picture dramas must necessarily be full of action. Hence it is that the dime novel plot, with its "thrill in

Hovering over the speeding train.

every chapter and throb in every line," provides an excellent scenario for the kinematograph. Unfortunately the film playwright labors under a serious handicap. "Could it really be done?" is a question that never bothers the author or reader of dime novel literature. There are no bounds to his flights of imagination.

The villain is escaping from the pursuing detective, on board a fast express. How shall he be apprehended? Simple enough. An aeroplane is faster than a train. The dime novel writer would have a flying machine handy. The detective would impress the aviator into his service, pursue the fleeing train, overhaul it, and drop from his flying car to the swaying roof of one of the railroad coaches.

It is easy enough to do this in print, and served with a good dressing of vivid adjectives, it can be turned into a most exciting episode. But the film playwright cannot give his imagination such free rein, for his play must be actually performed before it is put on the film. The idea of boarding a moving train from a flying machine, we should suppose would be too perilous to be even tried. But an enterprising film company found a man who was willing to risk his neck in the attempt. The feat was tried and accomplished, as the two photographs at the top of the page attest. We are indebted to *Sketch* for these two illustrations.

Hair Balls in Cows' Stomachs

THE accompanying photograph shows a ball of hair obtained from the stomach of a cow. Ruminants when licking themselves or their young swallow hairs which agglomerate into balls in their stomach. Eventually they grow large enough to irritate the stomach, setting up contractions of the latter and the esophagus which result in the ejection of the hair. Sometimes the balls grow too large to pass through the digestive tube, and cause the death of the beast.

The exterior of the ball here illustrated is as hard as wood. The photograph shows it cut in two, to reveal the interior, which is matted like felt.

A Searchlight for Sportsmen

By Our Berlin Correspondent

ENDEAVORS have been made repeatedly, but hitherto without any very satisfactory results, to design a source of artificial light, enabling shooters to indulge in their sport even by night. Practically every sportsman has on his shooting grounds some game or vermin which he is unable to get hold of by day, as it is too sly to leave the woods so long as there is any danger of its being shot. Attempts to provide a searchlight arrangement for hunting purposes have, therefore, been watched by sportsmen with unusual interest. Apart from being easy to handle and safe in operation, such an outfit must be of sufficient luminous intensity to insure really sportsmanlike shooting, and to allow the age and sex of the game to be ascertained in advance.

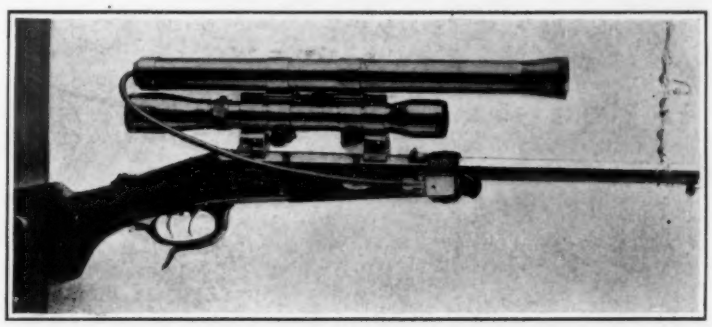
A firm of German constructors, after comprehensive and costly experiments, has succeeded in designing a really convenient shooting searchlight. This is readily mounted on any rifle and allows the back and front sights or the sighting telescope to be used in shooting, as the case may be. The searchlight projects a bright cone of light on the ground, up to a distance of 70 meters, or 230 feet, and enables one to take aim at the game in safety, while it is blinded by the light. In fact, it is well known that game struck by the dazzling glare of searchlights remains immovable, as paralyzed, for some time, which accounts for the numbers of animals that are run over by railway trains and motor cars.

In using the new searchlight, as soon as the approach of the game is heard or faintly seen, the rifle is cautiously pointed in the proper direction and the searchlight switched on. Should the game not be the one expected, the source of light is immediately switched out again, lest other game be frightened. In fact, the apparatus will only prove fully useful in the hands of skilled sportsmen; when used at random, it may even do more harm than good. In the case of pests, such as rabbits, it may, however, be switched in regularly every 10 minutes or so. The apparatus will render especially valuable services in big game shooting, in the extreme dark of tropical nights, where the dazzling effects are especially striking, so that aim may be taken in perfect safety. Again, the apparatus will prove most valuable in connection with game protection, poachers struck by its light being dazzled and made unable to defend themselves, whereas the ranger sheltered by the darkness of night, may handle his rifle in safety.

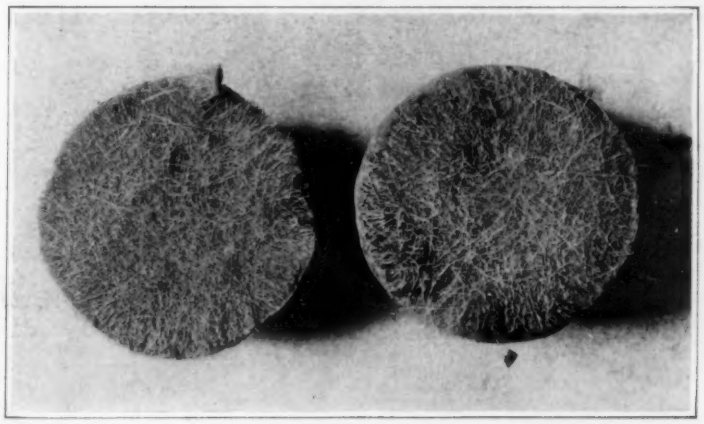
The main advantages of the apparatus may be summed up as follows: The battery and lamp are combined with the optical system in the same steel tube; the light is switched in readily without any special manipulations, and the weight of the outfit is so low as not to inconvenience the shooter in any way. Inasmuch as many sportsmen have only week-ends at their disposal, the use of the searchlight rifle will allow every

About to drop on the swaying car.

hour of their leisure time to be utilized for their favorite pastime.



Rifle with searchlight for night shooting.



Hair ball from a cow's stomach, sectioned to show the matted interior.

A sunshade for the working horse.

Cloud Movement Apparatus

AN effective and simple apparatus for observing movements of clouds is the invention of a French meteorologist, M. L. Besson. The nephoscopic "comb" has precisely the form of a magnified rake with the teeth pointing upward instead of at the side, it being made up of a long pole carrying a shorter cross pole at the top, this latter piece having seven upright teeth of about a foot length. A pole resembling a telegraph pole serves to hold the device in the air by means of two brackets, so that the device is held out a foot or two from the telegraph pole and parallel to it, and projects into the air somewhat above it, the base being mounted to rotate on a bracket shelf at the lower end and a short distance from the ground. To make an observation, the experimenter stands at a short distance off, and after sighting the middle point of the comb against the point on the cloud whose movement is to be observed, he pulls on a wrapped cord so as to turn the whole about and place the line of teeth in the direction of the cloud's motion. On the lower base is a card with the compass points so as to note the angle and direction, and the speed of cloud motion is estimated by taking the time needed for the cloud to pass from one tooth to another.

A Parasol for the Horse

TO protect and comfort the faithful horse who works all day long under the broiling sun without a sign of complaint, a tent has now been devised which may be set up on the shafts of a wagon over the body of the horse. The accompanying photograph shows how easily the device can be made. A light framework of steel, clamped to the shafts, holds the shelter in the right position, rigidly above the horse. The covering over the frame is nothing more than a heavy grade of canvas. When once this tent is adjusted it requires no further attention even when hitching the horse, for the latter simply walks under it and is buckled fast in the usual manner. Then the horse proceeds with his work sheltered by the equivalent of a parasol.

Five Year Patent Applications.—The order issued by the Commissioner of Patents, seeking to close up applications for patent which have been pending for five years or longer, has been amended so that it is now ordered that after June 1st, 1914, the examiners will make special every application which has been pending for five years or longer, and every application purporting to be a division or a continuation of an application which has been on file more than five years. Also that after November 30th, 1914, no amendment or other paper presented by or on behalf of applicant in any such application shall be entered without having been first called to the attention of the Commissioner. And that on December 1st, 1914, each Examiner shall report to the Commissioner the applications falling under this order which are pending in his division.

Inventions New and Interesting

Simple Patent Law: Patent Office News: Notes on Trademarks

The Transophone and the Telescribe: Two New Inventions of Thomas A. Edison

By Herbert T. Wade

THE saving of lost time and lost motion is as essential in a modern business office as it is in a mechanical plant, and much of the facility of present-day commercial methods has resulted from various ingenious devices and methods developed to save the time and effort of clerical employees, and to add to their comfort and convenience. Especially is it possible to secure increased facility in the handling of the necessary correspondence of a large office, in the making of records for the executive heads, and in the general administration of the business in hand.

For example, the supplanting of the "blind" typewriter with its hidden sheet, requiring the turning back of the carriage, by the machine with visible writing contributed in no small degree to the speed and accuracy of the preparation of commercial correspondence and records, while the use of the dictating machine, whereby the letters are transcribed from a phonographic record without the agency of a stenographer who has written them in shorthand, has been another step in advance. Recently, as another evidence of progress, there has been perfected by Thomas A. Edison and his engineers an ingenious device, known as the "transophone," which greatly increases not only the efficiency of the dictating machine, but the comfort and convenience of the typists who transcribe from the records.

How the Transophone Works.

The dictating machine or business phonograph is a familiar piece of office apparatus, consisting of a phonograph on whose wax cylinders are recorded, at the convenience of the user, such correspondence and memoranda or other material as he desires later to be transcribed on the typewriter. These spoken records may be made at any time at the convenience of the person concerned, to be collected and given to a typist, who places the cylinders in her dictating machine and adjusts the listening device, which has rubber tubes by which the sound is conveyed to her ears, and then writes on the machine as she hears the spoken words reproduced from the sound box. It is of course possible that a typist may not catch the sound accurately, or may require a repetition of one or more sentences. This was an early defect of the dictating machine, and was remedied in part by providing a lever for the typist, which could be adjusted so that the recording stylus could be sent back over a certain portion of the record and a repetition made. This, of course, required the operator to turn from her typewriter to operate the lever, causing a loss of time and a certain amount of distraction, as anyone who had given any thought to "motion study" readily might appreciate. In fact, an increase in efficiency of from 10 per cent to 25 per cent is claimed for the operator, to which must be added the effect of the reduced strain in transcribing.

Copyright by Thomas A. Edison.

Typist pressing the transophone key, which causes the dictating machine to repeat a portion of its record.

Many operators at first were not particularly partial to the dictating machine at best, and it often required some persuasion and training to enable the transcribing to be done efficiently and effectively in an office. While the use of the dictating machine was a considerable advance over the use of note-book and shorthand notes, Mr. Edison realized that the mechanical side of office writing still required considerable improvement, and accordingly, to avoid the former hand repeating of the dictating machine, he has now provided the transophone. In this a dictating machine is controlled electrically from the typewriter keyboard.

Copyright by Thomas A. Edison.

Edison listening to a telephone conversation recorded by means of his telescribe.

A special switch is provided, conveniently placed, and when the operator wishes a few words or a sentence repeated, she merely touches the button or key of the transophone switch, just as she would any key on her board, for, in fact, it is not unlike those corresponding to the various characters. Immediately the dictating machine automatically repeats over the space for which it has been set, giving a convenient number of words, one or a dozen or more. This can be done as often as desired, simply by touching the key, which is an electrical button, using the same essential touch as a typewriter key. This electric button actuates a "quick make-and-break" in a circuit with a magnet on the dictating machine, and when the latter is energized through the passage of the current, its armature is attracted, and a cam mechanism is operated, which lifts the traveling carriage from its screw and thus "back spaces" or moves it back the required distance on the feed screw, so that the repetition is effected as automatically as the operation of the mechanism is noiseless.

Difficulties That Had to Be Overcome.

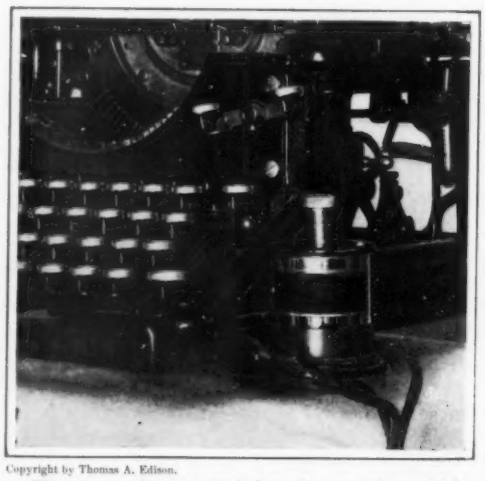
This would seem a simple mechanical undertaking, but its development has been attended with many difficulties. To begin with, the electrical button or switch itself is not the simple matter one might imagine would be secured by merely reproducing the detail of the typewriter key. It must operate on an ordinary 110-volt lighting circuit, but with an almost infinitely small consumption of current costing at a liberal estimate not more than 10 cents a year, and must meet the demand of the insurance officials for a sure and safe acting make-and-break key. Then again, the mechanical operation of the carriage of the dictating machine must be absolutely sure, as the record groove engraved by the stylus is almost microscopic, and the motion must be controlled within narrow limits.

However difficult this has been, it has been successfully accomplished, and one can see the operator at her typewriter using the dictating machine and keeping her eyes on the page she is writing or removing hands from the keyboard, without realizing that very often she is having words repeated for her without the slightest inconvenience or undue loss of time or motion, while the foot pedal enables her to start and stop the reproduction in the usual manner at convenient periods. Then there is a detachable connection.

The new invention unquestionably will act to increase the usefulness of the dictating machine, and at the same time commends itself to operators. It is typical of a class of inventions that may be recorded from time to time, where efficiency is gained by consulting the comfort of the individual employee, or in other words, bringing the mechanical side to bear upon the human element, to secure increased output. Furthermore, it is interesting to record that the transophone attachment may be added to any standard dictating machine by the simple process of replacement of a few parts that would interfere in no way with the essential construction and operation. In this way users of these machines may avail themselves of increased advantages secured by new inventions and improvements.

Recording a Telephone Conversation.

When Mr. Thomas A. Edison first brought out the phonograph, which, it is interesting to recall, received its general introduction to the public through a description in the columns of the SCIENTIFIC AMERICAN in 1877, there were a number of applications and uses that suggested themselves to the mind of the great inventor. Many of these have been achieved from time to time as the development of the phonograph has progressed, but others have encountered various obstacles in the way of their realization. One of the suggested applications that only recently has been brought to a successful outcome has been the use of the phonograph in connection with the recording of a telephone conversation. This has just been accomplished by the new "telescribe" which has been devised by Mr. Edison and his engineers, and is shortly to be placed upon the market in a practical and commercial form. To connect the receiver of a telephone with a phonograph would seem a simple sort of an undertaking, and theoretically presents no special difficulty, but in reducing this idea to practice there have been many obstacles to overcome, and the problem has received much attention from Mr. Edison and his associates for a number of years. Such a machine to be useful must be as sure, simple, and practical as the ordinary telephone or typewriter and no less efficient. It must be developed far beyond the range of laboratory practice or mere demonstration, and this has been done in the telescribe, which a representative of the SCIENTIFIC AMERICAN, by special invitation, was recently permitted to see in operation at the Edison Laboratories.



Copyright by Thomas A. Edison.

The transophone switch key, by pressing which the phonograph may be caused to repeat a portion of its record.

In one of the executive offices of the Edison Labora-

(Concluded on page 219.)

RECENTLY PATENTED INVENTIONS

These columns are open to all patentees. The notices are inserted by special arrangement with the inventors. Terms on application to the Advertising Department of the SCIENTIFIC AMERICAN.

Pertaining to Apparel.

DRESS FORM.—L. T. FURNAS, Lima, Ohio. This invention provides a dress form to be worn beneath corset covers, skirts, and other garments with a view to rectify deficiencies in the body of the wearer, and arranged to permit the user to accurately draw up the ruffles after washing the garments with a view to correctly shirr the ruffles to fit the garment.

BANDAGE CORSET.—PAULA KLEIN, 3462 Broadway, New York, N. Y. The object here is to provide an attachment which is applicable to corsets of general construction and designed for use by women after operations and for maternity uses so as to support the lower part of the abdomen and provide for increased comfort by avoiding all downward pressure and relieving and curing symptoms due to relaxed and inefficient abdominal walls.

Pertaining to Aviation.

AEROPLANE FUSELAGE.—A. J. A. DEPERDUSSIN, 19 Rue des Entrepreneurs, Paris, France. This invention relates to an aeroplane fuselage constituted entirely by the juxtaposition and cohesion, at crossed directions, of very thin slats of small widths of wood, cardboard, paper or the like. The fuselage obtained in this way is endowed with extraordinary rigidity and solidity.

Electrical Devices.

TELEPHONE.—L. S. BOYCE, Rockwell City, Iowa, and O. E. BOYCE, Glencoe, Minn. An object of this improvement is to provide an attachment by means of which a subscriber on a party line can listen and not be heard, but which will permit the subscriber to talk and be heard when a button is pushed.

ELECTRIC FURNACE.—N. TESTRUP, 6 Broad Street Place, London, England, and T. RIGBY, Station Hotel, Dumfries, Scotland. This invention relates to improvements in connection with smelting operations, and more particularly to such operations carried out in an electric smelting furnace and using peat as fuel. The processes are especially applicable to the smelting of iron.

Of Interest to Farmers.

FEED HOPPER.—H. B. MEIER, 222 Madison Ave., Port Chester, N. Y. This invention relates to the care of live stock and has particular reference to devices shown and claimed in Letters Patent of the U. S. for automatic time contact switches, No. 1,092,736, granted to Mr. Meier. The invention has reference to the form and construction of a feed container or hopper with novel means for maintaining its bottom in closed position until the predetermined time for the discharge of the feed.

LOADER.—C. M. WANGSNESS, care of Carl Brekke, Ray, N. D. In this case the invention relates to loaders and more particularly to devices including means for gathering and conveying hay and grain in the field to a wagon, cart or vehicle in connection with which the loader is moved from place to place.

Of General Interest.

POST ANCHOR.—P. T. BAILEY, Melville Station, Newport, R. I. This invention relates to post anchors, and particularly to an improved anchor which may be readily clamped in position at any time, and at any desired point along the post, whereby the post may be set any desired distance in the ground.

CLOTHES POUNDER.—H. L. ALBISSER and J. SIMON, 84 Monroe St., Rahway, N. J. This invention refers to improvements in washing apparatus, and particularly to what is known as a clothes pounder, and has for an object to provide an improved structure which will force or propel water through the clothes being washed.

ANIMAL TRAP.—C. M. C. KIRK, care of Leo M. Harris, South Fort George, British Columbia, Canada. This trap has means to support a resilient clasp, and means whereby the clasp will be automatically released by the animal, to grip the animal. In the preferred form of the invention a series of resilient clasps are slidably suspended on a rod; a retainer holds the clasps in the open position, and a step-by-step release means is controlled by movements of a bait holder.

FENCE WIRE SPLICING.—L. N. PFEIFFER, Kenton, Ohio. This invention provides a joint for connecting the ends of the wires together and the method of making the joint, the advantages being that a joint can be easily and quickly made, and at the same time possesses great strength and resisting power to longitudinal strains on the wire.

CLEANING TUBULAR AND OTHER VESSELS.—T. RIGBY, Station Hotel, Dumfries, Scotland, and N. TESTRUP, 6 Broad Street Place, London, England. This invention pertains to the removal of deposited matter from or the prevention of deposit in vessels employed in the treatment or handling of matters liable to produce deposits. An example of such an apparatus is the apparatus which has been proposed for wet carbonizing peat.

PENCIL.—H. REICHE, Box 755, New York, N. Y. This invention refers to certain improvements in pencils, and more particularly to that type of pencil in which the marking material is contained within an inner chamber or compartment and fed therefrom as required for use.

FIRE EXTINGUISHER.—T. ARESON, care of Thomas W. McKnight, Room 308-309, No. 147 E. 125th St., New York, N. Y. This inventor provides a gas tube having a terminal extending into a mouth of a gas reservoir which is suspended within a casing by springs, the terminal of the gas tube being spaced from the sides of the mouth of the reservoir to permit communication between the reservoir and the interior of the casing. The casing is filled and a gas is then compressed in the reservoir through the gas tube for forcing the fluid from the casing when a valve at the outlet to the casing is opened.

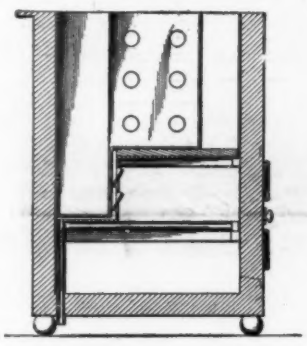
TILE STRUCTURE.—F. THOMAS, 357 E. 156th St., New York, N. Y. This improvement provides efficient, economical and simple means for retaining ceramic and other tile in service position; avoids the use of cement or other plastic material; and forms a backing or register for tile of the character mentioned to permit the removal of the tile from the service position.

Heating and Lighting.

POLE LATCH AND CAVEL.—E. F. JOYCE and W. B. KAIN, Wheeling, West Va. Address W. B. Kain, Supt. City Light Plant, same place. This device is adapted to be attached to the supporting pole of an electric light, for engagement by the flexible suspending member from longitudinal movement both in elevated and in lowered position, and wherein the arrangement is such that the lamp will be supported in either position, and may be easily lifted and held lifted, and without the possibility of being tampered with by unauthorized persons.

Household Utilities.

ICE BOX.—J. W. N. THIES, 539 W. 50th St., New York, N. Y. This invention relates to refrigerating devices, and particularly to what is known as a cooler and work bench combined, and has for an object to provide a structure which will maintain various goods



ICE BOX.

in a cool condition, and at the same time present a surface of cracked ice for use at all times. Means provide for causing the cracked ice to act as a cooling medium for articles arranged adjacent thereto.

VACUUM CLEANER.—A. B. MARSHALL, American Radiator Co., 104 W. 42nd St., New York, N. Y. An object here is to provide a tool with a plurality of openings which are normally covered by a valve, but which may be opened as desired by the operator, to admit a supply of air at the rear of the mouth of the tool, thereby regulating the flow of the air into the mouth of the tool, and permitting the use of the tool for a great variety of purposes, without changing the suction at the pump.

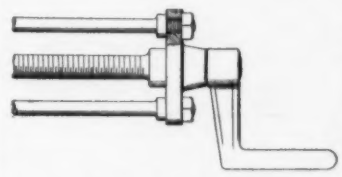
ICE SHAVER.—C. A. HORN, Chickasha, Okla. The blade being adjusted properly, the receptacle is moved over a block of ice with a planing action, and the slivers or shavings of ice pass into the receptacle. When a sufficient supply is collected, the cover is elevated, and the contents are pushed out at the front. When the cover is closed the coil spring is placed under tension, thus acting normally to retain the cover open, and the plate in its forward position. After the box is filled with ice shavings, merely by releasing one's grasp of the box it is automatically opened by the spring.

Machines and Mechanical Devices.

ROAD MACHINE.—M. M. SICKLER, Pala, Cal. This machine combines the advantages of a road grader and a scraper, and can move the material to side or center of a road and also forward along the line of work making fills, turnouts, and removing unevenness in road surface. The change from one class of work to the other, and the angle of the scraper blade to the line of work, can be made by combined action of draft and steering wheels, or by a manually operated mechanism without stopping the steam, or raising the scraper blade.

MACHINE FOR PRINTING CLOTHING TICKETS.—ALOISE ANTOINE and E. ANTOINE, care of the former, 183 Autumn St., Passaic, N. J. The present invention relates more particularly to the construction and arrangement of type-holders and inking devices therefor, from which the two sets of type with which these machines are provided, are supplied; and more particularly to the construction of certain features of the machine disclosed in patent No. 784,375, formerly granted to the inventors.

DRILL ATTACHMENT.—F. T. COOK, Miami, Okla. In this case the invention provides means for withdrawing a drill from a drill hole in the event of its becoming stuck there-



DRILL ATTACHMENT.

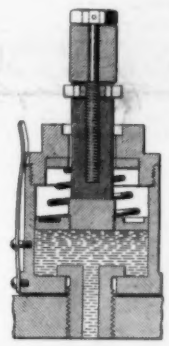
in, and irrespective of the length of the driller or the depth of the hole, with very little trouble or waste of time.

BRAKING DEVICE FOR REVERSIBLE GEAR MECHANISM.—F. J. ROBINSON, 44 W. Tyler St., Hampton, Va. An object here is to provide a braking mechanism for reversing gears in which a spring ring is so disposed with relation to a drum that the ring may be brought into contact with the drum at all points on its periphery when actuated and when free from the drum it may spring entirely away from the drum.

Prime Movers and Their Accessories.

CARBURETER.—W. J. OMER, care of Ever-Ready Boiler Scraper Co., Thomas, Okla. The purpose here is to provide a device adapted for use with internal combustion engines of every character, wherein mechanism is provided for thoroughly volatilizing gasoline or other liquid fuel, and for mixing the volatilized fuel with air to provide for perfect combustion of the fuel.

GREASE CUP.—R. M. MUSGROVE and F. R. HOWARD, 144 W. First St., South Salt Lake City, Utah. This invention relates to grease cups having a spring-pressed piston to force the grease from the cup to the member to be lubricated. It is applicable to the rotary parts of locomotives, stationary and traction engines, and other machinery. It resides in cer-



GREASE CUP.

tain features relating to the piston and piston rod, whereby to limit the forward movement of the piston under the action of the spring, so as to limit the total feed of the piston to any desired extent, the adjusting means being capable of holding the piston in retracted position against the movement of the spring, thereby cutting out the automatic feed feature.

SHORT-CIRCUITING ATTACHMENT FOR GAS-ENGINE IGNITERS.—C. M. WEEKS and H. N. JACKSON, Babylon, N. Y. This invention refers to means for grounding igniters by means of which the charges are exploded in the cylinders of multi-cylinder internal combustion engines, for the purpose of determining whether or not any of the cylinders are failing to work, and which particular cylinder with the igniter therein is defective in operation or entirely out of commission, owing to the fouling or short-circuiting of the spark-points inside of the combustion chamber, or from any other cause.

Railways and Their Accessories.

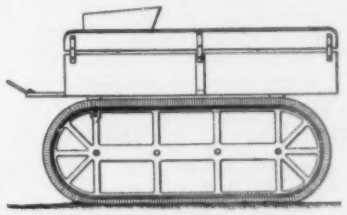
PORTABLE DERAILING DEVICE.—W. P. NEWKIRK, 509 Sixth St., Portsmouth, Ohio. This device is especially adapted for use in connection with car inspectors' and repairers' blue flags, is capable of being easily transported, adapted to be connected to a rail at any desired point, and has means for checking and derailing a car at any predetermined point to protect car repairs, inspectors, or track ends, and has means for supporting a flag or other signal.

Pertaining to Vehicles.

FIFTH WHEEL.—E. S. HALL, Bellfry, Mont. Mr. Hall's invention provides a fifth wheel which will relieve the king bolt from undue strain, and which will give great stability and firmness between the wagon parts, when a wagon with his improvement is used on uneven roads, or when the load is very heavy.

NON SKIDDING ATTACHMENT FOR AUTOMOBILE WHEELS.—D. J. PENNO, 420 Commercial St., Trinidad, Colo. The object in view is to provide a structure readily attached and removed, but when in place to positively prevent any appreciable skidding or side movement of the wheel. Another object is to provide a device arranged in a plurality of sections and adapted to engage the earth as the wheel rotates, but formed with means for yielding when a hard substance is engaged.

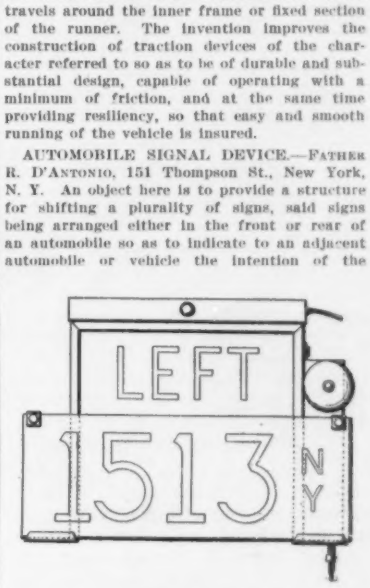
VEHICLE WHEEL OR RUNNER.—A. R. MOORE, Box 664, Mount Vernon, Wash. This invention relates to vehicle, and more particularly to elliptical wheels or runners in which



VEHICLE WHEEL OR RUNNER.

the tread consists of an endless element which travels around the inner frame or fixed section of the runner. The invention improves the construction of traction devices of the character referred to so as to be of durable and substantial design, capable of operating with a minimum of friction, and at the same time providing resiliency, so that easy and smooth running of the vehicle is insured.

AUTOMOBILE SIGNAL DEVICE.—FATHER R. D'ANTONIO, 151 Thompson St., New York, N. Y. An object here is to provide a structure for shifting a plurality of signs, said signs being arranged either in the front or rear of an automobile so as to indicate to an adjacent automobile or vehicle the intention of the



AUTOMOBILE SIGNAL DEVICE.

driver. Another object is to provide a plurality of signs which may be arranged in the back or front of an automobile, said signs being adapted to be operated by a signal lever, which lever may be moved different distances for raising the respective signs, said lever being arranged either in the form of a hand operated member or a foot operated member.

Designs.

DESIGN FOR A SNOW GUARD FOR ROOFS.—A. DANZER. Address Danzer Metal Works, West Lee St., Hagerstown, Md. In this ornamental design for a snow guard for roofs the form of the article is oblong, the length being double the height. The outlines at top and bottom extend in graceful curves to each end and to a blunt bird-bill shaped point.

Correction.

In the SCIENTIFIC AMERICAN of August 15th is a notice of a patent for cross tie to George F. Brockway, whose address in the notice should read *Waucoma, Iowa*, instead of Eden, Iowa.

NOTE.—Copies of any of these patents will be furnished by the SCIENTIFIC AMERICAN for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

WE wish to call attention to the fact that we are in a position to render competent services in every branch of patent or trade-mark work. Our staff is composed of mechanical, electrical and chemical experts, thoroughly trained to prepare and prosecute all patent applications, irrespective of the complex nature of the subject matter involved, or of the specialized, technical, or scientific knowledge required therefor.

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LEGAL NOTICES

PATENTS

If you have an invention which you wish to patent you can write fully and freely to Munn & Co. for advice in regard to the best way of obtaining protection. Please send sketches or a model of your invention and a description of the device, explaining its operation.

All communications are strictly confidential. Our vast practice, extending over a period of more than sixty years, enables us in many cases to advise in regard to patentability without any expense to the client. Our Hand Book on Patents is sent free on request. This explains our methods, terms, etc., in regard to PATENTS, TRADE MARKS, FOREIGN PATENTS, etc.

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SALESMEN FOR SMALL TOWNS, whole time, or side line. Special sales plan allowing return of unsold goods makes quick, easy, daily sales. $5.00 commission on each order. Something new. Write for pocket outfit. May Mfg. Co., 212 Sigel St., Chicago.

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PATENT ON TREE PROTECTOR or trap belt. Simple and cheap to make. Has strip of fabric fastened to plate on trunk of tree filled with chemicals to destroy insects. A. J. Kull, Far Hills, N. J.

INQUIRY COLUMN

READ THIS COLUMN CAREFULLY. You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. *In every case it is necessary to give the number of the inquiry.* Where manufacturers do not respond promptly the inquiry *may* be repeated.

MUNN & Co., INC.

Inquiry No. 9371. Information wanted where one could buy or have made to order machine to be used for making solid back brushes.

Inquiry No. 9372. Wanted the name and address of manufacturers of a collapsible box about 12 inches square. It must be strongly made to withstand rough usage in transit.

Inquiry No. 9373. Wanted the name and address of a manufacturer of machinery that will make twine out of scrap paper.

Inquiry No. 9374. Wanted the name and address of manufacturers of a powder paste which, when mixed with cold water, will make a white paste suitable for papering, costing no more than 3 cents per pound in ton lots.

Inquiry No. 9375. Wanted the name and address of the manufacturer of a separable fastener, invented especially for shoes and other articles.

Inquiry No. 9376. Wanted the name and address of a manufacturer making clock-work mechanism for running window display machines as employed by safety razor manufacture.

Inquiry No. 9377. Wanted the names and addresses of factories making farm implements for export.

Inquiry No. 9378. Wanted the name and address of a manufacturer of smooth metal mirror frames, such as are sold in 5 and 10 cent stores, with a mirror and a cardboard back.

Inquiry No. 9379. Wanted meteorites—information desired concerning available specimens.

Inquiry No. 9380. Wanted the name and address of a manufacturer of burners and handles for gas-heated sad iron.

Inquiry No. 9381. Wanted the name and address of manufacturers of vacuum adhesive hangers or other appliances for hanging cards, frames, charts, etc., to walls of buildings.

Inquiry No. 9382. Wanted the name and address of a manufacturer who can make a small or large quantity of sugar bowls with trade marks incorporated therein.

Inquiry No. 9383. Wanted the name and address of a manufacturer who can make clock movements suitable for fly trap. They must be furnished at low cost and must operate a half for a period of from two to four hours, or more.

Inquiry No. 9384. Wanted the name and address of a Company that can manufacture a combined toothpick and toothbrush made of special wood.

Inquiry No. 9385. Wanted the names and addresses of manufacturers of machines used for perforating music rolls for automatic pianos.

Inquiry No. 9386. Wanted a device to prevent eavesdropping on party telephone line.

Inquiry No. 9387. Wanted the name and address of manufacturer of composition roofing for tops of freight cars that will stand reasonable wear and tear, and for extreme wet weather and hot tropical climate.

Inquiry No. 9388. Wanted the name and addresses of manufacturers of a fiber board, which is absolutely smooth on both sides, not subject to warping and free from any imperfections such as ridges or small irregularities. Board should come to about 5 ft. wide by 5½ ft. long, and run from ⅛ to ¼ of an inch in thickness, and must be reasonably economical. A board of hard rubber would be exactly what was required, only the expense is too prohibitive to make its use practical.

Inquiry No. 9389. Wanted the name and address of manufacturers of valves, cylinders, recording gages, filling and weighing stands and all material and appliances which enter into the manufacture, transportation and sale of compressed gases.

Inquiry No. 9390. A syndicate of gentlemen desire to get in touch with an inventor or manufacturer of some small patented article with a view of placing the same on the market. Large capital and expert sales force if the invention or article stands examination. Automobile specialties preferred.

Inquiry No. 9391. Wanted the name and address of makers of plants for the utilization of by-products from sawdust, also waste wood.

Combining the Phonograph and the Camera

(Concluded from page 208.)

axis of the commutator, which is divided into six separate parts, this being for the purpose of forming a make-and-break circuit. From the commutator the electrical current passes by cable, which may be of any desired length, to the projecting machine or camera. For illustration, we will employ the projector. From this cable the current passes to a solenoid motor, consisting of six oscillating electromagnets, each of which is equipped with an armature or plunger. These magnets are cylindrical in form and their bottoms are especially wired. The upper ends of these plungers are connected to a horizontal crankshaft, which in turn is connected with a mechanism that turns the projector by means of bevel gears.

Each of the magnets of this motor is connected to one of the sections of the commutator, so that when a section of the commutator is pressed upon by the contact brushes its corresponding magnet is compelled to do the work for which it is intended, this being to draw its respective plunger to the bottom of the magnet. As the commutator is turned around these magnets are energized one after another, and in this manner they turn the crankshaft, which is a six-throw affair. The faster the commutator revolves, the faster is this solenoid motor compelled to work, the speed at which the projecting machine runs being in strict accord. It will be seen that it is impossible for these machines to go at different speeds. The speed of the phonograph regulates the commutator, which in turn controls the electric motor which propels the projector. The operation is very simple when understood.

The very same operation is used when the pictures are being taken and the record is being made. The unexposed film is placed in the camera and the blank record is put upon the phonograph. Before the machines are started the points of starting are marked so as to be easily found when it is desired to employ the reproducing process. The phonograph is started, this propelling the commutator, and this in like manner governing the speed of the motor or set of magnets by which the motion picture camera is propelled. The machines may be stopped and started at any point or points, operation to be resumed later by simply starting the phonograph, and this without the loss of synchronism. The motor used to run the camera is not so large as the one by which the projector is propelled. In fact, the camera motor is so small that it may readily be carried from place to place in a hand case. Each of the projector magnets is about four inches in diameter and ten inches in length. As it is now possible to make phonograph records with the performer standing at any distance up to thirty feet from the recorder, the combining of these two instruments for the production of all ordinary scenes or plays is extremely practical.

Moving Picture Panoramas

(Concluded from page 208.)

of a large circular hall, so as to cover simultaneously the whole of its circumference. In an ordinary kinematograph, films are, of course, projected by an intermittently operating mechanism, each section being successively illuminated, projected, and advanced in one sixteenth of a second. The projection of moving-picture panorama films is by no means more difficult, provided the camera described be supplemented by some illuminating means.

In order to facilitate the understanding of the underlying principle, let the film be supposed to be lighted intensely by a lamp arranged close behind it, above the axis of rotation *a*, thus converting the camera into a lantern projecting on the screen a narrow picture, in accordance with the width of the slot *d*.

Suppose the apparatus, installed in a circular hall with white walls, to be set rotating slowly: Narrow pictures, corresponding with each point of the original scene, will appear successively at the various parts of the circumference. If a

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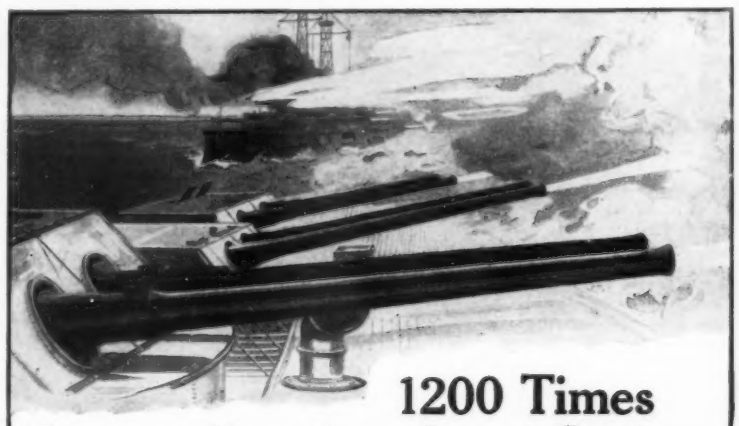

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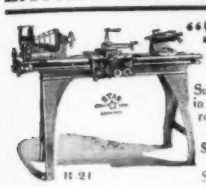

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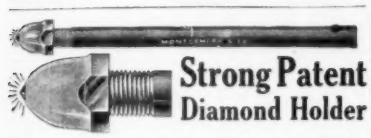

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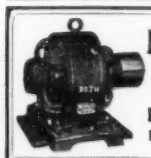

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tree was standing on one side of the scenery, in taking the kinematograph record, and a house on the other side, the tree will be projected *in succession* on opposite sides of the hall. Owing, however, to the persistence of visual impressions, the human eye will perceive simultaneously successive parts of the picture, provided the apparatus be turned round at a sufficient speed. In fact, the narrow bands composing the projection will melt into a single continuous picture covering the whole circumference of the hall like a real panorama. A similar principle has been embodied in the "photorama" designed by the Lumière Brothers, where rotating objectives were arranged to project a photograph wound on a glass drum.

In actual practice, it is, of course, impracticable to arrange the lamp immediately behind the film. A powerful searchlight is therefore installed outside of the apparatus, the light of which is thrown by mirrors through the hollow axis of rotation.

The astonishing result obtained by Dr. Goetz's apparatus may be described as follows: The Lumière "photorama" at each rotation projects an always identical picture, the picture passing before the slot of this apparatus is seen to vary continually, each turn bringing a new phase of the original motion into view. In fact, the projection thus obtained is a real moving-picture panorama, performing its natural movements, where houses and other immovable objects, of course, remain in position, the same as on an ordinary kinematograph film. The apparatus, it is true, requires an intense illumination; since, however, the insertion of a glass trough containing an acidulated 1 per cent solution of copper sulphite eliminates heat effects to 96 per cent nearly, this does not entail any danger.

Moving-picture panoramas literally place the spectator in the midst of a given event or scenery. He sees himself transferred to the center of traffic in a city where vehicles and pedestrians converge from all sides, to aerodromes, where airships and aeroplanes unceasingly perform their maneuvers, to horse, bicycle, and automobile races, football matches and other sporting events, processions, popular festivals, expositions, etc. He is afforded an opportunity of watching from the "Officers' Hill" the strategic operations of armies, and from the conning tower of a battleship the maneuvers of a fleet. He is able, in the moving-picture theater, to fancy himself aboard a steamer or in an open carriage, traversing the most fascinating scenery.

Panorama films may as well be cut into sections and projected intermittently on a plain screen, like ordinary kinematograph pictures.

The Transophone and the Telescribe

(Concluded from page 216.)

tories the writer was received by a representative of the general manager, who immediately proceeded to call up on the telephone the engineer in charge of this new and interesting instrument. He was asked if he would be able to make a demonstration of the machine, explaining that a description of it would interest the readers of the SCIENTIFIC AMERICAN. Accordingly an introduction of the author was made over the telephone, who explained his general wish to see the new instrument in operation. A few minutes later the experimental laboratory was reached, and sitting down in front of the telescribe, having in his ears the tubes of what seemed an ordinary Edison dictating machine, with a few simple extra adjuncts, and a small metal box on the desk before him, he was able to listen to a repetition of the previous telephone conversation which had been recorded on a wax cylinder. The voices of the three individuals participating in the conversation came out clearly and distinctly, and, further, it was possible to repeat at will any desired elements of the conversation.

The Field of the Telescribe.

The possibilities of the uses of the instrument at once suggested themselves. The first was the record of commercial transactions, many of which are made over the telephone by word of mouth, and may be subject to lapses of memory and misconceptions or misunderstandings. Furthermore, the recording of significant information as in a lawsuit, where an attorney may be informed as to what a witness will testify, and desires a more accurate record than could be obtained from memory, or, even if it were feasible to arrange for it, or from the record of a stenographer listening at a receiver on the same telephone circuit. Again, the transmission of late advertising copy by telephone where the exact words must be secured beyond question is another example. In fact, the possibilities of the new instrument seemed almost endless, and its perfection in commercial form seemed to suggest its availability for wide use.

The telescribe, like many other important inventions that have required years for their development and perfection, when examined, seems of the simplest character. No change is made in the ordinary telephone equipment, as there is no electrical or mechanical connection to the line. The person at the telephone wishing to record a conversation takes down the receiver as usual, and when he desires to have a phonographic record made, he simply places it (the receiver), with the diaphragm end downward, on a leather-cushioned spring socket, where it is snapped into a holder.

At the same time he picks up a watch-case receiver, forming a part of the telescribe, or extra telephone circuit, which he holds to his ear. Placing the ordinary receiver on the spring socket of the telescribe automatically switches that apparatus into operation, and from the time that the central operator is called and the connection established a complete record of the conversation may be made, including, of course, words spoken into the transmitter as well as those heard at the receiver.

Any sound resulting from the movement of the diaphragm of the main telephone receiver is communicated to a specially sensitive transmitter, placed in the metal box which houses the essential features of the apparatus, including a dry battery for the transmitter and a special pneumatic switch for operating the dictating machine. For it may not be necessary to record the entire conversation, only its essential parts, and the wax cylinder is started and stopped at the control of the listener simply by pressing two small buttons. The dictating machine is of the usual Edison type with a few important and special adjuncts, and it is interesting to observe here that in this, as practically in all the Edison apparatus, improvements and extensions can be made to the older types of apparatus by simple adjustments or substitutions and additions of new and essential elements. Here, in addition to the listening and recording features of the usual phonograph, there is a telephone receiver of special design, whose diaphragm vibrates in unison with the diaphragm of the sensitive transmitter in the metal box of the telescribe.

Directly below this telephone receiver, but not in mechanical connection, is the ordinary sound-recording diaphragm with its stylus, so that when the telephone receiver is in operation the diaphragm of the former vibrates in harmony with the action of the sound waves sent out from the metal disk, and the stylus cuts its groove of varying depth upon the wax of the revolving cylinder. This special telephone receiver, which forms an independent circuit from the telescribe transmitter with wires connecting with the metal box on the table, where the ordinary receiver is placed, is arranged so that it may be swiveled into place over the recorder of the dictating machine, whose ordinary operation and functions are in no way diminished or impaired when not in use for recording the conversation.

With the telescribe and dictating machine, therefore, an ordinary cylinder record or telescript can be made which can be filed for reference or evidence, repeated as often as desired, or transcribed if necessary, so that it is more than an "eavesdropper" on the telephone line.

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